LINCOLN COUNTY
YUCCA MOUNTAIN IMPACT REPORT

The report in this appendix may contain references to potential mitigation or compensation related to the impacts that are identified. ***It is the State of Nevada's firmly held position that no amount of mitigation or compensation will make Yucca Mountain or the related transportation of spent fuel and high-level radioactive waste acceptable to the State, and that Nevada is not seeking and will not negotiate for any type or amount of mitigation or compensation.*** Any discussion of mitigation or compensation contained in individual AULG reports is extraneous to the purpose of the State Yucca Mountain Impact Report, which is intended solely to present a comprehensive portrayal of the range of impacts associated with the federal repository program.

The magnitude of impacts statewide and the nature of those impacts lead to but one conclusion: ***The only way to protect Nevada – and the nation – from the massive, negative effects of this program is to abandon the Yucca Mountain project altogether, something Nevada contends should have occurred years ago.***

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Executive Summary

In 1982 Congress created the Nuclear Waste Policy Act, which designated a program for the management and disposal of high-level nuclear waste and spent nuclear fuel. In 1987, Congress amended the Act leaving Yucca Mountain as the sole area to study for the development of a nuclear waste repository. If recommended by the Secretary of Energy, nominated by the President to the Congress and authorized for construction and operation by the Congress, the Yucca Mountain repository system will have been unilaterally imposed on the residents of Nevada along with its attendant concentration of risk. The risks associated with the high-level nuclear waste will be transferred to the State of Nevada and its residents, while the benefits will have accrued throughout the country.

U.S. Department of Transportation (DOT) regulations require that truck transport of spent nuclear fuel and other high-level radioactive waste occur along the U.S. interstate system to the maximum extent possible. Alternative routes can be recommended by a state's governor. Under existing DOT regulations, the majority of spent nuclear fuel and other high-level radioactive waste destined for Yucca Mountain would be shipped through the Las Vegas metropolitan area. However, a desire to protect the State's gaming-based tourist economy will likely result in Nevada's governor recommending that the shipments utilize alternate routes that impact rural locations such as Lincoln County. These rural counties, already vulnerable to economic adjustments, are ill-equipped to deal with even minor disturbances to the local economic base. As a consequence, Lincoln County views any repository system related impact, regardless of scale, to require mitigation. There are unique local conditions and resultant impacts specific to Lincoln County, Nevada which require full consideration as an integral part of any decision to recommend Yucca Mountain as a safe and enduring repository.

This report has been developed to help Lincoln County understand the full range of impacts and risks that may be imposed upon it. The goal is to identify mitigation and compensation measures that will reduce the burden if Lincoln County is selected as part of a transport route to bring the high-level nuclear waste to Yucca Mountain and becomes the location for a rail/heavy-haul or rail/legal weight truck intermodal transfer facility.

This report has been submitted directly to the Secretary of Energy. Lincoln County expects the Secretary to consider the findings of this report in formulating a site recommendation to the President. In addition, Lincoln County expects the Secretary of Energy, pursuant to Section 114(a)(1)(G) of the Act, to submit this report to the President as a component of the site recommendation.

Since 1988, when Lincoln County received status of Affected Unit of Local Government, the County's Joint City/County Impact Alleviation Committee (JCCIAC) has commissioned a series of independent studies from respected researchers at technical consulting firms and academic institutions. These studies were designed to inform the residents of Lincoln County on the range of impacts that might be expected if the State of Nevada designates a heavy-haul or legal-weight truck route through Lincoln County, if the DOE builds a rail line between the City of Caliente and the Yucca Mountain repository and/or if the DOE sites a intermodal transfer facility near the City of Caliente. Topics addressed within these studies include economic/demographic baseline conditions and projections, emergency response, fiscal impacts, transportation risk assessment, stigma and risk perception, and environmental impacts. These studies, as well as additional relevant reports on risk, stigma, and transportation are the basis for this report.

The findings of this assessment indicate that Lincoln County can expect a broad range of impacts, including negative impacts on community cohesion, population driven effects, emergency management, highway accident risk, radiation exposure risk, and impacts from stigma that may reduce the desirability of Lincoln County as a place to live and as a destination for tourists. The identified impacts are summarized in ES-Table 1: Summary of Impacts to Lincoln County from the Yucca Mountain Repository System. This

assessment considered impacts from all phases of the repository, including site characterization, transportation system construction, transportation system operation, repository construction, and repository operation.

Issues pertaining to hazardous waste facilities including acceptance of compensation and payment of benefits are emotionally charged and known to be divisive. Lincoln County and the City of Caliente have experienced the impacts on cohesion within the community. These concerns will be pervasive throughout all phases of the repository project, from site characterization to closure.

In considering mitigation measures to reduce the impacts of the Yucca Mountain repository system on Lincoln County, Council for Environmental Quality (CEQ) management techniques were utilized as the framework. These are defined as follows:

- **Avoiding** the impact by not taking certain action or parts of an action.
- **Minimizing** impacts by limiting the degree or magnitude of the action and its implementation.
- **Rectifying** the impact by repairing, rehabilitating, or restoring the affected environment.
- **Reducing** or **eliminating** the impact over time by preservation and maintenance during the lifetime of the action.
- **Compensation** for the impact by replacing or providing substitute resources or environments.

Table ES-2 summarizes the options to mitigate impacts on Lincoln County from the Yucca Mountain repository system. The purpose is to highlight the range of techniques that would serve to mitigate impacts to Lincoln County, the City of Caliente, and their residents and businesses if DOE designates either rail or heavy-haul truck routes through the County or locates an intermodal facility near the City of Caliente. Often, mitigation requires specific action on the part of DOE and/or DOE contractors in order to avoid, minimize, or reduce impacts and risks.

Monetary compensation may be necessary for impacts that cannot be otherwise mitigated or require specific action by the County. Table ES-3: Summary of Potential Financial Compensation for Lincoln County, outlines the costs of mitigation where preliminary estimates of such costs have been possible.

The DOE has conducted only limited analysis of the risks inherent in transportation of quantities of highly radioactive spent nuclear fuel and high level waste on an unprecedented nationwide scale over a very long period of time. DOE has thus far represented to the Congress, the Administration, the State of Nevada, and affected units of local government that the overall risk implicit in the transportation to and storage in perpetuity of high level nuclear waste at Yucca Mountain represents minimal and statistically acceptable risk that is completely manageable.

A rationale for DOE's analytical approach to the DEIS is very difficult to understand, but has the effect of underestimating the real risks associated with transportation of high level waste. To date, DOE has largely overlooked socioeconomic and stigma based effects of the repository program on local economic and fiscal conditions. To suggest through non-consideration that the transport and storage of high-level nuclear waste will have virtually no socioeconomic or societal effects and limited environmental consequences is difficult for County residents to accept.

The lack of specific transportation plans and policy for Yucca Mountain and the magnitude of uncertainty associated with DOE's analysis of risk and the unique nature of the repository system make any definitive statement about the safety of the system, and impacts impossible. It would be impossible for the Administration and Congress to fail to seek to identify and implement possible means of mitigating impacts resulting from the Yucca Mountain repository system and to provide equity payments to affected units of local government.

Impacts described within this document are well beyond anything identified by the DOE in its Yucca Mountain DEIS. Under DOE's current schedule, Lincoln County will not have sufficient opportunity to review the final EIS, prior to issuance of this report. Lincoln County intends that DOE utilize the information in this report to inform its analysis for the final EIS. Further complicating Lincoln County's analysis of risks is the timeframe of the DOE process that delays to a later date the final decision about whether the high level waste destined for the Yucca Mountain Repository will be transported through Lincoln County and if so, by what mode.

After much research and analysis, Lincoln County has reached the conclusion that the transport of spent nuclear fuel and other high level radioactive waste through the County and the City of Caliente will result in a variety of impacts, which, if left unmitigated, will diminish the public health, safety and welfare of County and City residents.

Should circumstances and the will of the Administration and the Congress result in imposition of these potential impacts and risks upon residents of Lincoln County and the City of Caliente, compensation of impacts should be comprehensive and timely. Any delay to implement mitigation, including compensation, will only serve to exacerbate impacts.

Development and operation of the Yucca Mountain repository system will result in the transfer of risk and stigma associated with the management of spent nuclear fuel and other high-level radioactive waste from various locations around the United States to Nevada communities. Residents of all locations in the U.S. will benefit from the Yucca Mountain repository system to a degree disproportionate to the net benefits which might accrue to Nevada. Only Nevada communities will be left with the risk and stigma that will attend the long-term management of radioactive waste transported to Yucca Mountain. It is imperative that Nevada communities attain an equitable share of the National benefit that safe central storage and disposal of spent nuclear fuel and other high-level radioactive waste provides. Section 6.0 of this report suggests that the value of Nevada's share of said National benefit might range between $2.5 to $5 billion dollars.

Table ES-1: Summary of Potential Impacts in Lincoln County Resulting from the Yucca Mountain Repository System					
Impact Area	Site Characterization	Transp. System Const.	Transp. System Operation	Repository Const.	Repository Operation
Wastewater Treatment Cont'd.		- intermodal facility is currently located - Increased demands for wastewater services due to increased population	inmigration of new residents		
Municipal Water	No impacts anticipated	Increased water usage for construction, dust control, and increased population base	Increased water usage to the degree that the local population is increased	Increased water usage to the degree that the population base is increased	Increased water usage to the degree that the population base in increased
Local Oversight	Independent local oversight required	Independent local oversight required	Independent local oversight required	Independent local oversight required	Independent local oversight required
Local Government Finance	- Costs associated with repository oversight activities - Costs associated with legal matters	Increased population base will result in increased demands for service	- To the degree that transportation operators and intermodal facility employees become permanent residents demand for additional	Tax revenue associated with local manufacturer and sale of materials for repository system construction	- To the degree that transportation operators and intermodal facility employees become permanent residents demand for additional

Table ES-1: Summary of Potential Impacts in Lincoln County Resulting from the Yucca Mountain Repository System					
Impact Area	Site Characterization	Transp. System Const.	Transp. System Operation	Repository Const.	Repository Operation
Local Government Finance Cont'd.	- County Commiss-ioners and City Council members and time and staff time		services and facilities - Stigma induced revenue impacts		services and facilities
Land Use	No impacts anticipated	- New rail spur would impair livestock and wildlife movements and distribution - Livestock grazing and hunting may be affected	Potential for continued disruption due to habitat degradation and traffic	No impacts anticipated	No impacts anticipated
Highway Transp. Accident Risk	No impacts anticipated	Increase in vehicular accidents	Increase in vehicular accidents	Increase in vehicular accidents (movement of const. mtls.)	No impacts anticipated
Rail Transp. Risk	No impacts anticipated	Increase in vehicular accidents (movement of const. mtls.)	- Increased potential for rail accident given larger number	Limited, if rail lines are used to bring const. mtls. To the repository site	No impacts anticipated

Table ES-2: Summary of Options to Mitigate Impacts of the Yucca Mountain Repository System on Lincoln County

While monitoring is not considered an acceptable mitigation strategy under NEPA guidelines or from the perspective of Lincoln County and the City of Caliente, the unique characteristics of the Yucca Mountain repository and the potential stigma effects confound advance analysis of all potential impacts. Therefore, Lincoln County is requesting that DOE implement comprehensive monitoring programs (or fund Lincoln County to implement monitoring programs) of environmental and socioeconomic changes within the County as a result of the repository. In order for the monitoring program to serve as a mitigation measure, DOE must commit to necessary actions to mitigate impacts when (or if) they are detected.

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Air Quality	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• During construction use of water to control fugitive dust • Minimize truck and locomotive idling • Construction practices to minimize fugitive dust • All vehicles associated with the repository must be properly maintained • Do not build and operate intermodal facility in Caliente	• Help local businesses (existing and new) control emissions • Help local residents reduce auto emissions • Provide assistance to local residents to insulate homes & purchase more efficient appliances	• Use of "Best Available Control Technology" for all vehicles. Continue to upgrade vehicle emissions control equipment for the duration of the repository • Continual maintenance of all vehicles (DOE and contractors) associated with the repository	• Payment to County and City of fee linked to air emissions
Hydrology	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Design & construction of roads and facilities using state of the art techniques for optimal drainage that does not disturb existing water flow patterns • Ensure that oil, radiator, hydraulic, etc. leaks are repaired • Use of Best Management Practices as defined by EPA in 40 CFR 122.2 to control all potential water pollution	• Additional flood control and stream maintenance as necessary • Develop clear guidelines for reporting and clean-up of all spills at the intermodal facility, along the transport corridor and at construction sites • Ensure that clean-up procedures are followed • Provide clean up equipment and materials at possible spill locations	• Continual maintenance of all vehicles (DOE and contractors) associated with the repository, including regular inspections and repairs of fluid leaks (oil, radiator, hydraulic, etc.)	• Payment to County and City linked to degradation of water resources

Table ES-2: Page 2

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Viewshed	• Choose rail alignments to avoid pristine or highly valued vistas • Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Plant native shrubs and trees to soften the visual impact of the intermodal facility and transport facilities. • Design and color of the intermodal facility should be compatible with local architecture	• Revegetate cleared areas with species that are native to the area • Use of berms and other landscaping screens to soften the visual impact of the intermodal and transport facilities	• Maintain trees and plants for healthy growth and appearance • Maintain revegetated areas to full maturity	• Funding to County and City for landscaping viewshed enhancement projects

Table ES-2: Page 3

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Radiation Exposure	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Limit the number of casks at intermodal facility at one time. • Limit length of time casks can stay at facility • Develop policy to ensure the intermodal facility will not become a holding area in the event that the repository is temporarily unable to take casks • Create appropriate distance and barriers between the intermodal facility and residential or public functions. • use strategies to reduce stops during transport and ensure that stops are in non-populated areas • Consider the rail only option as a means of reducing radiation exposure	• Provide for NRC, DOT, County and City independent oversight and monitoring of intermodal and other transportation activities • Design and implement rapid response radiation control and decontamination process	• Use radiation badges for intermodal facility workers and transport workers. If unacceptable levels of radiation are detected, change practices to reduce doses • If unacceptable levels of radiation are detected in the County/City, implement changes in practices to reduce levels • Provide on-going monitoring and training of operating staff	• Fund County/City for staffing and equipment to implement independent monitoring and oversight of radiation levels. • Fund equipment and training for medical staff in County/City to facilitate identification and treatment of radiation sickness • Establish advance commitment to provide compensation for Lincoln County and the City of Caliente in the event that heightened radiation levels are detected, due to normal activities or in the event of an accident that results in a breach of containment

Table ES-2: Page 4

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Community Cohesion	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Maintain forums for community participation in decision-making and monitoring functions • Enhance public information programs • Design and implement effective risk communication programs	• Design and implement community conflict resolution programs	• Good faith efforts on the part of DOE to mitigate and compensate Lincoln County for all negative impacts associated with the repository • Active policy on the part of DOE to maximize economic benefits within Lincoln County	• Provide benefits to the community such as a public park, public pool, community center or other amenity desired by residents • Provide funds to County/City to conduct independent monitoring and oversight of DOE activities • Provide funds for independent monitoring of environmental and socioeconomic impacts
Political Divisiveness	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Maintain forums for community participation in decision-making and monitoring functions functions • Enhance public information programs • Design and implement effective risk communication programs	• Design and implement community conflict resolution programs	• DOE commitment to reduce the negative impacts of the repository • DOE commitment to maximize benefits within the community from the repository • DOE commitment to minimize risks associated with transportation activities	• Commitment from DOE to provide funds for County or City to defend against litigation brought by others regarding the repository system

Table ES-2: Page 5

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Employment	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	(The goal is to **maximize** Job opportunities) • Implement local job training programs • Locate ancillary office functions in Lincoln County • Encourage Yucca Mountain construction and operation related suppliers to locate in Lincoln County • Implement hiring policy that gives Lincoln County residents a fair opportunity to apply • Busing programs from Lincoln County to the repository.	• Design and implement regional marketing strategy • Establish trust fund to enable rapid implementation of a marketing strategy	• Encourage use of HubZone certified vendors in Lincoln County	• Fund regional economic development initiatives • Deed intermodal and other transportation infrastructure to County and City following emplacement
Income	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	(The goal is to **maximize** local income benefits) • DOE should establish procurement policy to increase purchases of goods and services from Lincoln County • DOE should establish an adequate wage structure	• Design and implement regional marketing strategy • Establish trust fund to enable rapid implementation of a marketing strategy	• Encourage use of Hubzone certified vendors in Lincoln County	• Fund regional economic development initiatives • Deed intermodal and other transportation infrastructure to County and City following emplacement

Table ES-2: Page 6

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Emergency Management	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• To the degree that DOE takes responsibility for emergency management for an incident involving the nuclear waste casks (with or without a release of radiation to the environment) this will reduce the overall impact on Lincoln County • Cross training and reciprocal agreements with other impacted communities and DOE • Adhere to strict safety standards and operating procedures • Minimize the time for supporting personnel and equipment to arrive at the scene of an accident • Provide guidance and ensure that community has the appropriate level of training and equipment • Clarify responsibilities in response procedures between federal, state, and local governments • Locate critical or difficult to move equipment in Lincoln County to reduce response times	• Develop and implement equipment decontamination replacement strategy • Establish emergency response/medical supply replacement strategy • Establish trust fund to allow rapid decontamination and replacement of equipment and supplies	• DOE to implement a continual evaluation (external audit) of the transport, intermodal and repository safety procedures and operations and establish improved safety protocols as the need is identified	• Funding to purchase additional monitoring detection equipment and equipment for radiological incident management • Funding for additional staff for increased non-radiological and radiological incidents • Funding for continuing training in emergency management of radioactive material • Contingency for grants to reimburse the County/City for costs incurred during any incident related to repository activity. • Funding to develop and publicize an evacuation plan for the communities. • Funding to acquire and operate emergency notification system • Funds to upgrade emergency communication equipment and ensure that different departments have capability to communicate with each other

Table ES-2: Page 7

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Emergency Medical	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Cross training and reciprocal agreements with other impacted areas and DOE • Develop a standard of competency for radiological medical treatment and ensure that staff meet the minimum requirements • Transport of spent nuclear fuel and high-level waste along routes that avoid Lincoln County	• Develop and implement equipment decontamination replacement strategy • Establish emergency response/medical supply replacement strategy • Establish trust fund to allow rapid decontamination and replaceemnt of equipment and supplies	• DOE to implement a continual evaluation (external audit) of the transport, intermodal and repository safety procedures and operations and establish improved safety protocols as the need is identified	• Funding to purchase additional equipment. • Funding for additional staff, for non-radiological incidents and radiological incidents • Contingency for grants to reimburse the County/City for costs incurred during any incident related to repository activity. • On-going radiological training for medical staff • Funds to modify hospital to provide capability for quarantine • Funds to develop an evacuation plan for the hospital staff and educate staff
Schools	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Employ existing residents	• Provide temporary facilities		• Funding to Lincoln County school districts to cover additional costs and/or improve facilities

Table ES-2: Page 8

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Streets	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Modify railroad crossing in Caliente to reduce conflict with road traffic • Forbid loaded trucks from traveling on local streets (provide transport at the intermodal facility for truck drivers to access town restaurants/hotels)	• DOE to pay the County and City a per truck fee if the legal or heavy-haul trucks utilize County or City maintained roads	• Increased level of service for County/City streets and roads	• Funding to compensate for additional maintenance and repair costs • Funding to cover the costs of additional safety mechanisms, such as stop signs, street lights and parking controls
Wastewater Treatment	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County • Don't locate the intermodal facility at the site of the wastewater treatment facility for Caliente	• If DOE locates the intermodal facility at the site of the wastewater treatment facility, DOE will relocate the current facility, using modern technology	• Ensure no loss of service due to replacement activities		• If in-migration puts a strain on wastewater facilities, funding to compensate for the costs of upgrading and expanding the existing facilities
Municipal Water	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County • Truck in water for control of fugitive dust, and other construction needs from elsewhere to avoid depleting the groundwater reserves in Lincoln County	• Ensure that oil, radiator, hydraulic, etc. leaks are repaired • Use of Best Management Practices as defined by EPA in 40 CFR 122.2 to control all potential water pollution	• Develop clear guidelines for reporting and clean-up of all spills at the intermodal facility, along the transport corridor and at construction sites • Ensure that clean-up procedures are followed • Provide clean up equipment and materials near all possible spill locations	• Continual maintenance of all vehicles (DOE and contractors) associated with the repository, including regular inspections and repairs of fluid leaks (oil, radiator, hydraulic, etc.)	• Funds to improve and expand water facilities in communities that will be impacted by population growth due to the repository. This could include expanding water supply, enhancing storage capabilities and/or other improvements to the facilities that will benefit the communities.

Table ES-2: Page 9

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Local Oversight	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• DOE to provide information and maintain good communication with the local oversight staff • Strong independent state/NRC oversight • Provide for continued local oversight evaluation	• Provide for continued local oversight evaluation	• Provide for continued local oversight evaluation	• Funding for independent local oversight and monitoring programs
Local Government Finance	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County • Fully fund all fiscal impacts in advance	• Minimize stigma • Reduce lag-time between impact detection and mitigation implementation	• Develop and implement regional marketing program • Budget supplements for unanticipated expenses	• Develop and implement regional marketing program	• Funding to local governments to compensate for additional staff and facilities • Funding to local governments to cover the cost of servicing the expanded population • Compensate local governments for capital outlays if stigma-induced effects reduce population • Payments sufficient to cover all possible recurring impacts (PETT)

Table ES-2: Page 10

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Land Use	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• The number and location of borrow pits and fill areas should be sensitive to local land uses and not constrain or disturb previous activity • If DOE activity disturbs drinking water sites, drill additional wells or otherwise ensure enough water for previous uses • Ensure that the rail spur or other activity do not disturb livestock forage areas and migrations	• Seed areas that are disturbed to produce additional forage for domestic livestock and wild animals		• Monetary compensation for landowners for any portion of their land that cannot be used for previous activities due to the repository (temporarily or permanently) • Monetary compensation to farmers if livestock or agricultural products reduce in value due to downwind location from the repository

Table ES-2: Page 11

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Highway Transportation Accident Risk	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Third traffic lane on Highways 93, 318, and 375 • lead and follow cars • special warning lights and signs • Elimination of at grade railroad crossings on public roads and highways • Special signage on private railroad crossings • Restrictions on truck movements in inclement weather • DOE should evaluate the safety characteristics of the two-lane roads that may be utilized • DOE should fund and staff a weather monitoring and communication system to advise transport operators and County staff • Enhanced winter road condition maintenance • Lane separation on Oak Springs Summit and Hancock Summit	• Local control and management participation in accident assessments • Highway upgrades and enhanced maintenance	• Monitor for accidents and adjust safety procedures to eliminate additional risk • DOE to implement a continual evaluation (external audit) of the transport safety procedures and to modify protocols as the need is identified	• Funding for the County/City to cover costs of any safety mechanisms that DOE does not implement directly • Contingency for grants to reimburse the County/City for costs incurred during any incident related to repository activity. • Paving of Kane Springs Road so Caliente residents have alternate route to Las Vegas

Table ES-2: Page 12

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Rail Transportation Accident Risk	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Special training and operating procedures for train crews • Regular evaluation and maintenance of rail lines • Detection system for floods and landslides		• Monitor for accidents and adjust safety procedures to eliminate additional risk	• Contingency for grants to reimburse the County/City for costs incurred during any incident related to repository activity.
Tourism	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Maintain impeccable safety record at the repository and the intermodal facility • Develop and implement risk communication plan • Develop and implement on-going regional marketing strategy • Area quality of life initiatives	• Maintain impeccable safety record at the repository and the intermodal facility • Enhanced risk communication • Enhanced regional marketing initiatives • Area quality of life initiatives	• Maintain impeccable safety record at the repository and the intermodal facility • Sustained education and risk communication campaign • Sustained regional marketing initiatives • Area Quality of life initiatives	• Grants to Lincoln County and the City of Caliente to fund advertisements and to enhance marketing plans • A contingency agreement to compensate the County/City in the event that tourism is affected due to the repository system

Table ES-2: Page 13

Impact Area	Avoid	Minimize	Rectify	Reduce/Eliminate Over Time	Compensate
Economic Development	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• DOE policy that favors Lincoln County for purchase of construction materials and finished products • DOE could establish satellite offices for the repository in Lincoln County • Rachel area development as a community for repository workers	• Maintain impeccable safety record at the repository and the intermodal facility	• If DOE develops a rail spur line through the County, policy should allow the County's mining and manufacturing industry to benefit from the enhanced access	• A contingency agreement to compensate County/City if businesses that were planning on locating in the County/City reverse their decision based on the repository system • A contingency agreement to compensate County/City if inmigrants that were planning on locating in the County/City reverse their decision based on the repository system • Grant County/City repository system infrastructure following emplacement
Real Property	• Do not proceed with Yucca Mountain project • Do not transport nuclear waste through Lincoln County	• Maintain impeccable safety record at the repository and the intermodal facility • Develop and implement regional marketing plan • Develop and implement property enhancement plan • Develop and implement risk communication plan • DOE investments in community assets	• Maintain impeccable safety record at the repository and the intermodal facility • Develop and implement property enhancement plan • DOE investment in community assets	• Maintain impeccable safety record at the repository and the intermodal facility • Develop and implement property enhancement plan • DOE investment in community assets	• Establish pre-project property value data-base and monitor for changes in property values along the transport corridor • Compensation for property owners along transportation routes and throughout the community if property values decline due to repository system

Table ES-3: Summary of Estimated Costs for Selected Lincoln County Mitigation Measures

Impact Area	Mitigation Measures	Cost Basis	Initial Investment	Annual Repl. and Maintenance
Air Quality	3 air quality monitoring stations	Estimate	$ 450,000	$ 100,000
Environmental Hydrology	30 water quality monitoring stations	Estimate (including lab analysis)	$ 150,000	$ 100,000
Noise	4 monitoring stations	Estimate	$ 100,000	$ 25,000
	Landscape noise barriers	Estimate	$ 200,000	$ 20,000
Viewshed	Landscaped berm to screen intermodal facility	Estimate	$ 300,000	$ 30,000
	Two gateway entrance settings for the City of Caliente	Estimate	$ 400,000	$ 40,000
Radiation Exposure	10 radiation monitoring stations	Estimate	$ 1,500,000	$ 15,000

Table ES-3: Page 2

Impact Area	Mitigation Measures	Cost Basis	Initial Investment	Annual Repl. and Maintenance
Community Cohesion	Capital facilities to enhance quality of life	4 pools, 4 community centers	$ 6,000,000	$ 600,000
Political Divisiveness	Compensation for past legal costs	Legal costs accrued to the City of Caliente and Lincoln County defending lawsuits brought by State of Nevada	$ 200,000	N/A
	Costs for County Commissioner Meetings	Repository issues on agenda approx. six times per year. Each time, discussed for 1 hour. Plus 1 hour for prep/minutes, for 2 hours per meeting. Five Commissioners + 1 admin. staff = 6 people x six meetings. @$35/hr.	N/A	$ 1,260
	Costs for Caliente Council Meetings	Repository issues on agenda approx. six times per year. Each time, discussed for 1 hour. Plus 1 hour for prep/minutes. for 2 hours per meeting. 5 Councilmembers + 1 admin. Staff = 6 people x six meetings. @$35/hr.	N/A	$ 2,360
Employment	Vocational and job training through the Community College	Assumes 100 students at $1,000 each	$ 100,000	$ 25,000
	Internet-based local job service	12 computer stations	$ 48,000	$ 4,000
Emergency Management	Costs for emergency equipment. Costs for training, cost to develop and publicize evacuation plan, cost of additional staff.	Estimate	$ 1,000,000	$ 250,000
	Cost of six public address systems for communication and evacuation	Communication between Federal Signal Corporation and Lincoln County Emergency Management	$ 120,000	$ 24,000
	Mobile command and communication center	Estimate	$ 300,000	$ 30,000
	Cost to educate the public about the evacuation system, prepardness and routes	Estimate	$ 50,000	$ 10,000

Table ES-3: Page 3

Impact Area	Mitigation Measures	Cost Basis	Initial Investment	Annual Rep.and Maintenance
Emergency Medical	Costs for equipment and supplies for a radiological event	Medical Cabinet on wheels and supplies	$ 5,000	$ 500
	Cost for six staff training's for a radiological event	Estimate	$ 30,000	$ 5,000
	Costs for two additional medical staff	Estimate	$ 200,000	$ 200,000
	Costs to modify hospital to provide a quarantine area for a radiological patient	Estimate	$ 500,000	$ 50,000
Schools	Cost per student	$8,044 per student educated in Lincoln County in 2000. Taken from the "Accountability Report" Includes instruction, administration, buildings and operations, student support and staff support. X 24 new students.		$ 193,056
	Capital costs to expand facilities	$10,630.17 per student for capital costs. Superintendent of the Lincoln County School District. X 24 students.	$ 255,124	
Streets	Compensation on a per capita or per shipment basis for new residents	Estimate	$ 1,000,000	$ 500
Wastewater Treatment	Replace facility	Estimate	$ 6,000,000	$ 600,000
Municipal Water	Monitor system supply and demand	Estimate of $15,000 per well	$ 150,000	$ 50,000
	Facility improvements	Estimate	$ 1,000,000	$ 100,000
Local Oversight	Costs of continued oversight	$550,000 per year		$ 550,000
	Joint County/City Impact Alleviation Committee members volunteer time	300 person hours/year @ $30.00/hour (16 years to date for initial payment)	$ 144,000	$ 9,000

Table ES-3: Page 4

Impact Area	Mitigation Measures	Cost Basis	Initial Investment	Annual Repl. and Maintenance
Local Government Finance	Cost to monitor local government finance	Estimate	$ 50,000	$ 30,000
Land Use	Lost AUM's	Estimate 2,900 acres lost at 35 acres per AUM. Total of 82 AUM's lost at $1,000 each	$ 82,000	N/A
Highway Accident Risk	Cost of additional safety mechanisms that DOE does not implement	Estimate	$ 500,000	$ 100,000
	Upgrade County Snow-removal equipment to improve road safety for trucks	Estimate	$ 250,000	$ 100,000
Rail Accident Risk	Cost of additional safety mechanisms that DOE does not implement	Estimate	$ 500,000	$ 100,000
Tourism	Costs to enhance and implement marketing plans to mitigate the effect of stigma	Estimate	$ 50,000	$ 50,000
Economic Development	Costs to enhance and implement marketing plans to mitigate the effect of stigma	Estimate	$ 50,000	$ 50,000
Real Property	Funds to establish a data-base on property values along transport corridor and monitor	Estimate	$ 250,000	$ 50,000

In Search of Equity: A Preliminary Assessment of the Impacts of Developing and Operating the Yucca Mountain Repository On Lincoln County and the City of Caliente, Nevada

1.0 Introduction

1.1 Purpose of Lincoln County Impact Report

This assessment of impacts and identification of feasible mitigation options for Lincoln County and the City of Caliente has been prepared to:

(1) Ensure that when developing and making a recommendation to the President regarding Yucca Mountain, the Secretary of Energy understands the nature of and methods to mitigate impacts of the Yucca Mountain repository system upon the residents, visitors, environment and economy of Lincoln County and the City of Caliente;

(2) Ensure that when developing a nomination and nominating the Yucca Mountain site to the Congress as this Nation's first deep-geologic repository for spent nuclear fuel and other high-level radioactive waste, the President understands the nature of and methods to mitigate impacts of the Yucca Mountain repository system upon the residents, visitors, environment and economy of Lincoln County and the City of Caliente;

(3) Ensure that when considering whether to authorize development of the Yucca Mountain repository system consistent with the President's nomination of the site, the Congress understands the nature of and methods to mitigate impacts of the Yucca Mountain repository system upon the residents, visitors, environment and economy of Lincoln County and the City of Caliente;

(4) Ensure that when preparing its impact report to the Secretary of Energy, the State of Nevada understands the nature of and methods to mitigate impacts of the Yucca Mountain repository system upon the residents, visitors, environment and economy of Lincoln County and the City of Caliente; and

(5) Ensure that when the Nevada Legislature is considering providing input and its response to the Secretary of Energy's recommendation of the Yucca Mountain site as this Nation's first deep-geologic repository for spent nuclear fuel and other high-level radioactive waste, the Legislature understands the nature of and methods to mitigate impacts of the Yucca Mountain repository system upon the residents, visitors, environment and economy of Lincoln County and the City of Caliente.

The Nuclear Waste Policy Act of 1982 (NWPA), as amended in 1987, provides for the State of Nevada to prepare and submit to the Secretary of Energy an impact report. Section 114(a)(1) (H) of the Act states, "... Together with any recommendation of a site under this subparagraph, the Secretary shall make available to the public, and submit to the President, a comprehensive statement of the basis of such recommendation, including the following:
...(G) such other information as the Secretary considers appropriate and,
...(H) any impact report submitted under section 116(c)(2)(B) [U.S.C. 10136(c)(2)(B) by the State of Nevada.

Unique local conditions and resultant impacts specific to Lincoln County and the City of Caliente require full consideration as an integral part of any decision to recommend this nation's first deep geologic repository. This report has been submitted to the Secretary of Energy and is expected to be considered by the Secretary in formulating a recommendation to the President regarding development and operation of a repository at Yucca Mountain. The County and City expect the Secretary of Energy to submit this report, pursuant to Section 114(a)(1)(G) of the Act, to the President. In addition, the County and City may base a subsequent request for financial and technical assistance, pursuant to Section 116(c)(2)(A)(i) of the Nuclear Waste Policy Act of 1982, as amended, upon all or a part of the information contained within this report.

In formulating and submitting such a request for financial and technical assistance pursuant to Section 116(c) of the NWPA, Lincoln County and the City of Caliente would not expect the limited analysis contained within the Department of Energy's (DOE)Yucca Mountain environmental impact statement to limit the types and magnitude of effects to be considered for mitigation pursuant to Section 116(c). In fact, the Director of DOE's Office of Civilian

Radioactive Waste Management has made clear "the provision of assistance under Section 116 would not necessarily be limited either by the impacts identified in the Yucca Mountain EIS or by its findings concerning such impacts. A decision to provide assistance under Section 116 will be based on an evaluation of a report submitted by an Affected Unit of Local Government (AULG) pursuant to section 116 to document likely economic, social, public health and safety, and environmental impacts." (U.S. Department of Energy, 1999c)

1.2 Involuntary Nature of Impacts

Neither Lincoln County, the City of Caliente, nor their residents have endorsed characterization or development of Yucca Mountain as the sole deep geologic repository for the Nation's high-level and spent reactor fuel nuclear waste, hereafter referred to as "high level waste". Rather the County and City, through their JCCIAC, have sought to understand and minimize risks; understand and minimize impacts, and understand and maximize potential repository system economic and fiscal benefits.

DOE's program to provide for safe centralized long-term stewardship of spent nuclear fuel and other high-level radioactive wastes is arguably necessary. If recommended by the Secretary of Energy, nominated by the President to the Congress and authorized for construction and operation by the Congress, the Yucca Mountain repository system will have been unilaterally imposed on the residents of Nevada along with its attendant concentration of risk.

Within Nevada, the perceived need to protect the State's gaming-based tourist economy from postulated adverse consequences will likely result in shipments of spent nuclear fuel and other high-level radioactive waste moving through rural areas such as Lincoln County and the City of Caliente. The largest quantities and the greatest number of shipments of spent nuclear fuel and other high-level radioactive waste ever will be transported through rural Nevada on highly funneled routes and stored in perpetuity at Yucca Mountain, presuming the site is found suitable.

The Yucca Mountain repository system represents an unwanted industrial activity. The allocation of Nevada's natural, social, fiscal and economic resources required to support the location and operation of the repository system represents an opportunity cost as these same

resources will be unavailable for allocation in support of other desired industrial activities. As a consequence, Lincoln County and the City of Caliente view any repository system related impact, regardless of scale, to require mitigation.

1.3 Lincoln County Status as an Affected Unit of Local Government

Lincoln County is one of ten units of local government which have been designated by the Secretary of Energy as "affected" pursuant to the Nuclear Waste Policy Act, as amended. Pursuant to Section 116(c) of the Nuclear Waste Policy Act, as amended, the County has prepared and is submitting this impact report for consideration by the Secretary of Energy in deciding whether, and on what basis, to recommend Yucca Mountain to the President as the site of the Nation's first deep-geologic repository.

Lincoln County has conducted a productive repository oversight program during the past twelve years. Lincoln County and the City of Caliente formed the Joint City/County Impact Alleviation Committee (JCCIAC). This Committee has primary responsibility for design and implementation of City and County oversight activities, which provides information to residents as well as providing insights on potential repository system impacts. County and City elected officials and Committee members have toured DOE and private utility nuclear facilities. These tours have afforded County representatives with a valuable perspective on nuclear facility implications for other communities.

1.4 Activities Leading to Preparation of this Report

1.4.1 Joint City/County Impact Alleviation Committee

In 1984 Lincoln County and the City of Caliente entered into a Memorandum of Understanding (MOU) to organize the joint conduct of repository related impact alleviation planning. This MOU has been renewed regularly during the past sixteen years. In addition to establishing a joint County/City repository oversight function, the MOU set forth the parameters for program funding and administrative and technical responsibilities. The MOU also established the Joint City/County Impact Alleviation committee (JCCIAC) to oversee the program, and authorized the County and City to retain technical, management and legal consultants.

The purpose of the JCCIAC is to guide the County/City repository oversight program and make recommendations regarding program directions. Originally a six-member committee when organized in 1984, the JCCIAC was expanded to eight members in 1987. Four members are appointed by Lincoln County and four by the City of Caliente. The Committee, representing both geographic and disciplinary diversity, has invested over 1,200 hours of mostly volunteer time to understand the implications of the Nation's nuclear waste management program to Lincoln County.

The JCCIAC members have supervised the conduct of comprehensive studies documenting repository system implications for Lincoln County. Topics addressed within these studies include economic/demographic baseline conditions, emergency response, economic/demographic projections, transportation risk assessment, stigma and risk perception, and environmental impacts, among others.

The studies and databases developed by the County have resulted from the collective efforts of experienced researchers representing both academic and private institutions. These various studies and data serve to underpin the identification and evaluation of impacts presented within this report. Given the identification of resultant impacts and the need to mitigate system effects, the County encourages the Secretary of Energy to consider the input received from affected parties as a means to better determine the feasibility of proceeding with the Yucca Mountain repository system. Lincoln County further recommends that the expense of mitigating impacts associated with the project be considered a component of project costs when determining if, and on what basis, the Yucca Mountain repository system should be developed and operated.

1.4.2 Input to DOE NEPA Compliance Activities

Lincoln County has been an active participant in National Environmental Policy Act compliance initiatives undertaken by DOE. Lincoln County's JCCIAC is experienced with DOE NEPA compliance activities having provided extensive input to DOE on the scope of the Sitewide EIS for the Nevada Test Site (NTS); the Multi-Purpose Canister (MPC) EIS; and the Draft Yucca Mountain EIS. Each of the NEPA compliance activities address transportation of spent nuclear fuel, other high-level radioactive wastes, and/or low-level radioactive wastes. In each case,

comments submitted by the County and City reflect concern that DOE activities be conducted in a manner which enhances the health, safety and welfare of area residents. In each case, DOE has largely ignored the issues raised by Lincoln County and the City of Caliente. As a consequence, the Draft EIS for the Yucca Mountain Project fails to address many key impact issues of importance to the County and City. County and City officials have been assured by DOE OCRWM leadership that limitations in the scope of impacts addressed in the Draft and Final Yucca Mountain EIS will not limit the Secretary of Energy's consideration of impacts identified by affected units of local government in impact reports such as this document represents. Indeed, DOE staff have encouraged affected units of local government in Nevada to prepare and submit impact reports to the Secretary of Energy.

2.0 Lincoln County in Perspective

The identification of impacts to Lincoln County and the City of Caliente resulting from the Yucca Mountain repository system is unique for conditions that characterize the County and City. Similarly, mitigation measures that may be appropriate to manage repository system effects in Lincoln County and the City of Caliente may differ from those feasible or acceptable in other locales. It is imperative then that the unique conditions which render Lincoln County and the City of Caliente distinctive places be considered in evaluating impacts and means to mitigate effects.

2.1 Location and Physiography

Lincoln County is located in southeastern Nevada. The County is the third largest (10,635 square miles) in Nevada containing 10.0 percent of the State's total land area. It is bounded by Nye County to the West, Clark County (Las Vegas metropolitan area) to the south, White Pine County to the north and Utah to the east. There are four main population centers in Lincoln County: Pioche (County Seat), Alamo, the City of Caliente, and Panaca. Nearly 30 percent of the County's population lives in Caliente. From Caliente, the geographic center of the County, by way of U.S. 93, Las Vegas is approximately 145 miles to the southwest. (1991 Lincoln County Overall Economic Development Plan)

The topography generally consists of alternating, linear mountain ranges between broad flat valleys characteristic of the Basin and Range Province. Similar to the balance of the State, mountain ranges and valleys in Lincoln County have a north-south orientation. Elevations range from a high of 9,398 feet (Highland Peak) to a low of approximately 1,900 feet in the Tule Wash area. Within the County many diverse plants are located. The eastern landscape of the County is covered with Pinyon-Juniper. The western area is predominately salt desert shrub with scattered Pinyon-Juniper and northern desert shrub. Wetland vegetation occurs along rivers, streams, and marshy areas.

Precipitation within the County is generally low. Moisture falls as snow at the higher elevations (such as in the Clover Mountains, the Delamars, and the Cedar Range) from December through February, and as rain at the lower elevations. In the late summer (July through September) short

duration, high intensity thunderstorms are common throughout the County. Annual average precipitation ranges from just over six inches in the southern area of the County to seventeen inches at higher elevations in the northeast. Winter temperatures are generally mild, although occasional arctic storms bring cold weather to the County. Summer days are generally hot with cool evening temperatures.

2.2 Economy

Lincoln County is characterized by farming and ranching operations in the south (Pahranagat Valley from Alamo to Hiko), and in the north (Meadow Valley from Caliente through Panaca to Pioche) (Lincoln County,1991). Ranching and livestock grazing also occurs on public lands throughout the County. An abundance of outdoor recreational activities such as camping, fishing, hunting, and water skiing are available in Lincoln County. There are five State parks located in Lincoln County. The Desert National Wildlife Range and the Pahranagat National Wildlife Refuge are located south of Alamo. Numerous historic mining districts, prehistoric sites and vast undeveloped areas exist throughout the County. Transportation is a key facet of the area economy with U.S. 93 and the mainline Union Pacific railroad crossing the County and City.

Almost 96.0 percent of the land in Lincoln County is federally owned. The balance, 4.0 percent, is owned by the State of Nevada, local governments, and private individuals.

In earlier decades, Lincoln was a self-sustaining and economically thriving area. However, because the economic base was highly dependent upon a few key industries, it became vulnerable to economic cycles and competition, technological change, and corporate decisions over which the local population had no control. Mining and railroad employment have declined significantly. Since the early 1960s, the economy of the County has become highly dependent on government-related employment, tourism, and retirees. (Intertech Services Corporation, 1991)

Diversification and expansion of the Lincoln County economy has been very difficult due to limitations in private land availability. Nearly 96 percent of the County is land administered by the federal government.

2.3 Population

The County-wide population in 2000 was approximately 4,253, concentrated in and around the City of Caliente. The Nevada State Demographer estimates by the year 2010, Lincoln County's population will grow by just 27 persons to 4,280(Nevada State Demographers Office web page, 2001). Growth of the County and City will likely depend on the success of efforts to attract new business to the area. Expansion of tourist related visitation is also viewed as key to the area's future.

2.4 Transportation

Lincoln County is traversed north to south by US 93, which runs from the border with White Pine County on the North to the border of Clark County to the South. This is a two-lane highway that passes directly through the City of Caliente. Most of the communities in Lincoln County are found close to US 93, including Pioche, Panaca, Crystal Springs, Ash Springs, and Alamo. East-west, Lincoln County is traversed by a route that begins at Utah with State Route 319, merges with US 93, and then shifts to State Route 375 until reaching the border with Nye County. These routes through Lincoln County are two-lane with minimal availability of pullout areas, rest stops, or service facilities.

3.0 Types of Effects Considered

Construction and operation of the Yucca Mountain repository system will result in a variety of environmental, socioeconomic and fiscal consequences. The discussion of impacts which follows seeks to identify the environmental, social, economic and fiscal effects of alternatives being considered for implementation of the Yucca Mountain repository system in Nevada. Of particular concern are adverse effects that cannot be avoided, the relationship between short-term uses of the environment, the maintenance and enhancement of long-term productivity of natural resources and irreversible or irretrievable commitments of resources.

Lincoln County is concerned that the Department of Energy may not adequately consider the temporal aspects of impacts resulting from the repository system in Nevada. This impact report considers impacts from the following phases of the project: site characterization, transportation system construction, repository construction, transportation system operation, and repository operation.

During each phase of the repository program, a variety of types of effects to Lincoln County and the City of Caliente are possible. A description of the types of effects considered in this report follows.

3.1 Direct Effects

The consideration of repository system impacts includes effects that are caused by the development and operation of the repository system and occur at the same time and place. These "direct" effects are directly attributable to implementation by DOE of the proposed action and any alternatives thereto.

3.2 Indirect Effects

This impact report considers effects caused by DOE implementation of repository system preferred action or alternatives thereto but are later in time or further removed in distance from the direct effects, yet are reasonably foreseeable. Indirect effects include those that are growth inducing or inhibiting or otherwise related to changes in land use patterns, population density, or growth rate.

3.3 Cumulative Effects

When determining whether to recommend the Yucca Mountain site to the President, the Secretary of Energy should consider the cumulative consequences to Nevada, Lincoln County, and the City of Caliente of repository system development and operation. Cumulative effects result from incremental impact of the proposed action or alternatives when added to other past, present and reasonably foreseeable future actions, regardless of which agency or person undertakes them. Cumulative effects can result from individually minor, but collectively significant, actions taking place over time. In the case of Lincoln County, the Secretary of Energy must consider the cumulative effects of past actions taken by the federal government at the Nevada Test Site (NTS), added to future shipments of spent nuclear fuel and other high-level radioactive waste being transported through the County and City.

3.4 Conflicts with Plans

In determining the feasibility of proceeding with the Yucca Mountain Project and on what basis and for what cost the repository system will be established and operated, the Secretary of Energy should consider the extent to which the project conflicts with other federal, state, local and tribal plans, policies or controls. This impact report focuses upon conflicts between local government plans in Lincoln County and the City of Caliente. According to NEPA the term "land use plan" includes all types of formally adopted documents for land use planning, zoning and related regulatory requirements, including formally proposed plans. The term "policy" includes formally adopted statements of land use policy as embodied in laws or regulations, including formally proposed policies. Following sections of this report consider the extent and implications of conflicts between DOE proposed action and alternatives for implementation of the repository system and plans, policies and regulations adopted by the County and City.

3.5 Unavoidable Effects

Of particular concern to the County and City will be those effects of the Yucca Mountain repository system that cannot be avoided. Recognition by the Secretary of Energy of the need to mitigate all unavoidable impacts is imperative. This report seeks to identify unavoidable effects such that formulation of a recommendation by the Secretary of Energy regarding Yucca

Mountain is fully informed by the knowledge of effects. The environment, local governments, residents and local businesses might each suffer.

3.6 Impact Scenarios

The following impact scenarios are presented to illustrate the types of events and consequences of possible Department of Energy action to transport spent nuclear fuel through Lincoln County and the construction and operation of an intermodal facility near the City of Caliente. The presentation of these example scenarios is provided as a means to assist the reader to conceptualize potential repository system impacts.

Scenarios used in this report are considered credible. While intended to address a wide range of possible impacts, the scenarios are not intended to represent what might be considered "worst case" situations and outcomes. Rather, the following scenarios depict events and outcomes considered likely to occur during the 30-year emplacement period for repository system. In formulating the following scenarios, Lincoln County has considered both transportation and repository operation related initiating events (ie. truck accident, volcanism). The County and City consider a transportation accident to be the most likely cause of repository system impacts. The volcanism scenario represents an admittedly very low probability initiating event. However unlikely a disruptive volcanic event at the Yucca Mountain may be, such an occurrence can not be entirely discounted.

3.6.1 Impact Scenario #1

On June 27, approximately six miles west of Caliente on U.S. Highway 93, a truck transporting spent nuclear fuel (SNF) collides with a truck transporting gasoline (**initiating event**). The resulting fire burns for nearly three hours, during which time the seals on the SNF shipping cask fail resulting in small amounts of radiation to escape into the accessible environment. Wind patterns carry the radionuclides toward the City of Caliente and populated zones. Residents are told to stay indoors until testing can determine the level of radiation risk. Hwy 93 is immediately closed and remains so for many days, although eventual cleanup activities extend for several weeks.

The accident is widely reported in national print and television news media. Due largely to the lack of accurate information immediately following the accident, press accounts of the severity of radiation releases and exposure risk are greatly exaggerated. Conflicting accounts of the accident and risk by government officials only serve to heighten media amplification of reported risk. Local, regional and national perceptions of the immediate and long-term risks resulting from the accident are all quite high.

Within 8 hours following the accident, operators of hotels and motels in Lincoln County communities begin to receive mass cancellations. Heading into the busy Fourth of July weekend, reserved rooms have fallen from near 85 percent occupancy to just under 40 percent occupancy. Cancellations extend to nearly four weeks out with occupancy rates at that time down from a pre-accident level of 72 percent to just over 54 percent.

As a consequence of the accident and related media amplification of risk, visitation to Lincoln County during the following four weeks is off by an estimated 30 to 40 percent. Based upon historic levels of visitor spending in the County, it is estimated that $500,000 in visitor spending has been lost during the four weeks following the accident. These losses are supported by sales tax, room tax and fuel tax reports for the period. Direct economic impacts appear to have been centered in the trade (20 percent) and services (80 percent) sectors of the local economy.

Lincoln County and the City of Caliente engaged the University of Nevada, Reno Center for Economic Development (UNR-CED) (1999) to develop an economic/fiscal/demographic impact model for independent repository impact assessment activities. Application of the model to the aforementioned impact scenario suggests that the total direct and indirect economic impacts of the $500,000 reduction in visitor spending would exceed $850,000.

According to DOE estimates, the maximum reasonable foreseeable truck accident scenario would result in exposure within 50 miles of an accident site. DOE estimates that about 5 latent cancer fatalities in the exposed population would occur (U.S. DOE, 1999a). The two drivers of the spent fuel truck and the driver of the tanker are killed in the accident.

3.6.2 Impact Scenario #2

A volcanic eruption occurs beneath the Yucca Mountain repository site (**initiating event**). The containment capability of one or more waste canisters is compromised resulting in radionuclides to be transported in the ash plume. The plume rises nearly 15,000 feet into the atmosphere and is carried by prevailing winds to the east-northeast at 20 miles per hour. Caliente, Pioche, and Panaca, Alamo, and Hiko are located downwind path of the ash plume. Atmospheric monitoring confirms the radiation content of the plume and downwind communities are advised to take emergency precautions. Within 8 hours ash is settling in Alamo and Hiko. An hour later ash begins to fall in Caliente, Pioche, and Panaca. Monitoring detects low levels of radiation in the ash.

Most Lincoln County residents have heeded the instructions of authorities and have evacuated north to White Pine and Elko counties. Authorities in these communities are quickly overwhelmed with the need to provide emergency shelter and assistance to persons arriving from Lincoln County. A few hundred residents have remained in the area and are now confined to their homes.

3.6.3 Impact Scenario #3

On June 30, in the afternoon, an eastbound train carrying a flammable, explosive chemical is parked on a siding approximately 5 miles east of the City of Caliente. A westbound train carrying spent nuclear fuel casks to the intermodal facility in Caliente collides with the parked chemical train (**initiating event**). The subsequent investigation into the cause of the accident reveals that a switching failure resulted in the mis-direction of the train carrying the spent nuclear fuel casks. The collision results in a fire which burns out of control for three hours, causing the seals on the casks to fail. Atmospheric radiation is detected in the area and evacuation procedures are initiated for the City of Caliente, the towns of Pioche and Panaca, and the five state parks that are within thirty miles of the accident.

The event is widely reported in the media, with all the major news outlets sending teams of reporters to the area for late-breaking news and to interview residents and park visitors about the accident and the evacuation. Most residents and visitors express lingering doubts about exposure

to radiation even though the DOE has assured the media that there was only minimal radiation released into the atmosphere and prevailing winds minimized the risks of exposure.

Within hours after the accident is reported in the media, local hotels begin to receive cancellations for the normally busy July 4th weekend and well into the summer. Visitation to the County and the State parks is substantially less than normal for the summer months, resulting in lost revenue for local merchants, reduced tax revenue for the County and the local governments.

According to DOE estimates, the maximum reasonable foreseeable rail accident scenario would result in exposure within 50 miles of an accident site. DOE estimates that about 31 latent cancer fatalities in the exposed population would occur (U.S. DOE, 1999a). Three members of the rail crews are killed in the accident. The UP mainline is closed immediately following the accident and remains so for several days. Decontamination of the area limits rail traffic through the area for several weeks.

4.0 Characterization of Impacts

4.1 Physiographic

The Department of Energy must consider the extent to which the repository system may adversely effect the quality of the natural environment which currently characterizes Lincoln County. Such existing conditions render the County a desirable place for current and potential residents to live and tourists to visit.

4.1.1 Air Quality

Lincoln County and the City of Caliente are both within federal National Ambient Air Quality Standards (NAAQS) (EPA, Region 9). The NAAQS is a health-based standard for carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), lead (Pb), particulate matter (PM-10 and PM-2.5), and sulfur dioxide (SO_2). Under the State of Nevada's air quality classification system, all of Lincoln County has been designated as a Class 2 Attainment Area. Class 2 allows for moderate degradation. At this time permitting for new industries is not difficult.

Construction and operation of the repository and associated transportation activity are not anticipated to change the region's status regarding NAAQS compliance for CO, NO_2, O_3, Pb, or SO_2.

Construction of a spur rail line, the intermodal facility, a new wastewater treatment facility for the City of Caliente, or improvements to roadways, may result in enough fugitive dust to exceed the 24-hour NAAQS standard for particulate matter (PM-10 and/or PM 2.5) (US Nuclear Regulatory Commission, 2000). If this were to occur it would be a temporary, localized effect, but it could impair roadway visibility, cause health difficulties for individuals with asthma or other respiratory ailments, and degrade the scenic quality in the vicinity of the construction activity.

Compliance with the NAAQS standard is based on a "bright line" established by the US Environmental Protection Agency that does not account for degrees of degradation. Although

repository associated emissions are not likely to cause a permanent shift of Lincoln County's status to non-attainment, the air quality will be degraded.

Construction and operation of a rail spur line and a rail/truck intermodal facility, roadway improvements, and additional through traffic associated with construction and operation of the repository and legal-weight or heavy-haul trucks and trains passing through the County will all adversely impact the air quality. Criteria emissions will increase due to both combustion and evaporation of gasoline and diesel fuels. There will be additional fugitive dust (particulate matter) due to repository related road traffic.

Clean, healthy air has a high value and is an attribute that people expect and seek with rural community living. This is especially important to retirees when choosing a location to live. If the air quality is degraded too much, current residents may feel compelled to move away and prospective new residents may pass up Lincoln County communities in favor of areas with lessor levels of emissions.

At this time, air quality is an attribute and not a constraint to businesses considering locating in Lincoln County or the City of Caliente. In communities whose air quality does not meet federal health standards, such constraints include potential costly emissions control technology or other emissions off-set requirements that raise the total cost of doing business. Off-sets can be a voluntary option or a requirement for a business that is implicated in reducing air quality. The business may choose to help finance the cost of reducing emissions elsewhere if they find that this is more cost effective than reducing their own emissions or if they cannot reduce their own emissions. The goal is to maintain the quality of the pool of common property (air or water) at a level no worse than if the business had not located in that region. If repository related activities result in unmitigated declines in area air quality, the County or the City may find it more difficult to attract desirable businesses into the region.

4.1.2 Hydrology

Both permanent and ephemeral streams could be impacted during construction. Alterations in quantity and flow could have a significant impact on wildlife and domestic livestock which

depend on these water sources. DOE notes that the proposed intermodal facility in Caliente is 0.12 miles from a perennial steam and some of the proposed heavy-haul routes pass within 0.6 miles from water resources (US DOE. 1999a. p. 6-10).

Water quality could also be impacted by repository related activity. Additional truck traffic will increase the potential for non-point source run-off of oil and other pollutants from the vehicles into the surrounding above or underground water. Impervious surfaces associated with the intermodal facility will create an additional point source for pollution that may wash into surrounding water sources during storms. In the event of an accident, oil or other chemicals may be released into the environment and seep into surface streams or contaminate underground water.

4.1.3 Noise

Neither the State of Nevada, Lincoln County or the City of Caliente have established numerical noise standards. The average day-night noise level in the desert ranges from 22 to 38 decibels. Rural agricultural communities, such as Panaca, Rachel, and Alamo have sound levels in the range of 40-47 decibels. Small towns or rural commercial communities, such as the City of Caliente typically have sound levels in the range of 45-55 decibels. Many agencies, including the Environmental Protection Agency, recognize an average day-night sound level of 55 decibels as an outdoor goal for protecting public health and welfare in residential areas (US DOE, 1999a, p 3-87).

Communities in Lincoln County generally have very low ambient noise levels. (Except the DMOA which is subject to periodic military aircraft overflights with varying levels of intensity.) Lincoln County and the City of Caliente can both expect to be impacted from additional noise due to the construction and operation of an intermodal facility and related rail and highway improvements, and from rail and truck movements through the region. DOE does anticipate the intermodal facility receiving trains on a 24-hour basis, but the heavy-haul trucks would be restricted to operating during day time hours only (US DOE, 1999a, p. 8-90 & 6-50).

DOE estimates that construction noise for the intermodal facility and upgrades to the highway to accommodate heavy-haul trucks would be 45 dBA at 6,600 feet in addition to ambient background levels. The noise from heavy-haul trucks would be greatest when loaded heavy-haul trucks are moving up grades at speeds as slow as 5 miles per hour. This could occur as the trucks approached the repository site and on portions of the Caliente route. At 30 miles per hour, the estimated noise from a single heavy-haul truck moving up a 5-percent grade would be 45 dBA at a distance for 2,100 feet (US DOE, 1999a, p. 6-97).

The noise level for railroad construction would range from 62 to 74 dBA within 500 feet of the construction and from 54 to 67 dBA within 2,000 feet of the noise source (USDOE, 1999a, p. 6-50). This is a decibel level increase of approximately 100 percent in non-community areas and up to 50 percent in community areas.

Residents living near the rail corridor will also experience increased noise levels due to the increased number of trains passing by.

4.1.4 Viewshed

Unobstructed scenic vistas and views are valuable attributes that enhance quality of life and attract tourists. This is especially salient to people who have made a choice to live in smaller towns. If DOE locates an intermodal facility near the City of Caliente, the viewshed in the vicinity of the entrance to Rainbow canyon may be altered. There may also be temporary impacts during to construction.

The BLM uses four visual resource classes in the management of public lands. Classes I and II are the most valued, Class III is moderately valued, and Class IV is of least value. The potential rail spurs in Lincoln County pass through lands that are designated as Class III. The viewshed surrounding the Kershaw-Ryan state Park is designated Class II and might be impacted by the intermodal facility (US DOE, 1999a, p. 3-116 & 8-91).

A new rail corridor will be a visible feature of the landscape and will impact the viewshed, particularly from Wilderness Study Areas, which have been identified by the BLM as candidates for wilderness designation.

During construction of the rail spur, intermodal facility and upgrades to existing highways to accommodate heavy-haul trucks there would be construction yards and camps, vehicles, earth-moving equipment, laydown yards, and dust generation (US DOE, 1999a, p. 6-50). Borrow pits will also result in long-term visual impacts to the landscape. Within Lincoln County, it is estimated that 2,899 acres will be disturbed during construction. Of this amount, 1,085 of the disturbed acres will result in permanent changes to the landscape. (ie. widened roadways, the rail line, and the intermodal facility.) The remaining 1,814 acres will be disturbed during construction and will need to be revegetated. Despite revegetation it may be many years before the landscape is restored to pre-construction conditions.

4.2 Radiation Exposure

Lincoln County and the City of Caliente are located downwind of the Nevada Test Site (NTS). Residents of the County and City have historically been exposed to radioisotopes deposited in the area following above and below-ground nuclear weapons tests at NTS. There were 100 above ground and 828 below ground bomb tests prior to the suspension of testing. Containment failure during underground testing was not uncommon and bomb test schedules were routinely adjusted so the tests occurred when the wind was directed east or northeast (often toward Lincoln County). The objective was to direct the plume of radioactivity toward low population areas and to minimize the aggregate dose received by the population in the test site region. Throughout DOE's history of weapon testing at NTS, much of Lincoln County was designated as an "Offsite Uncontrollable Area," meaning that in the event of an unanticipated atmospheric venting of radionuclides, communities within this area could not be effectively evacuated to ensure protection from exposure.

The result of this past policy is that residents of Lincoln County and the City of Caliente have been exposed to greater radiation risk than most of the communities throughout the country that will be impacted by the transport of the nuclear waste. Therefore, the radiological impacts of

Yucca Mountain cannot be evaluated alone, but should be assessed with an eye towards the cumulative effects of long-term and/or repeated exposure to radiation risk (Goble, 1994). Latent and genetic disorders are a possible consequence of Yucca Mountain related exposure. Although monitoring has not detected ongoing releases to the environment related to NTS, DOE has made quantitative estimates of offsite doses from releases from past weapons testing activities at NTS (US DOE, 1999a, p. 3-83). This data would give DOE a good base to begin a complete assessment of the cumulative past, present and future exposure that Lincoln County residents might experience.

Ethnographic studies of County residents reveal a pattern of real and potential exposures to radiation hazards by those who participated in outdoor activities during or immediately following such tests. Many surveyed believe that it is extremely likely that the NTS has caused health problems in the past (White, et al, 1990). The legacy of County residents having lived with these risks, is evidenced today by a concern that many residents have about continuing and future exposure risks from DOE activities at NTS. Whether real or perceived, risks to area residents can result in adverse social and economic consequences (Intertech Services Corporation, 1995a).

Many area citizens have expressed feelings of powerlessness in the face of government and a sense of injustice. There is a long-standing distrust of the federal government and dissatisfaction with its responses to residents' concerns about the effects of nuclear weapons programs. The presence of the repository brings another element of exposure to the residents of Lincoln County. In the highly unlikely event of a volcanic eruption beneath Yucca Mountain, airborne radioisotopes could be transported from the repository to the proximity of Lincoln County in 1.5 to 8 hours (Intertech Services Corporation, 1995b).

The transportation of nuclear waste through Lincoln County and the City of Caliente will be attended by a certain degree of exposure risk. Radiological exposure can be expected for truck drivers, intermodal facility workers, workers at truck rest stops, residents with homes close to the transport corridors, and other citizens that come within close proximity of the casks.

Risk assessments conducted by the Department of Energy assume that a majority of the residents of the City of Caliente may be exposed to radiation if rail transport through the City becomes the preferred option. RADTRAN, a probabilistic risk assessment code developed by Sandia National Laboratory for radioactive materials transportation analysis assumes a non-incident exposure zone to 800 meters (1/2 mile) on either side of the transport corridor. The Yucca Mountain DEIS also assumes an exposure zone of 800 meters. Most of the City of Caliente, including the higher density residential neighborhoods and the commercial neighborhoods fall within this 1/2 mile zone. The actual exposure level decreases with increasing distance from the rail-line or highway over which the nuclear waste is being transported. At 2 meters DOE uses a value to 10 millirem per hour of exposure. At 800 meters the exposure is reduced to less than 0.0002 millirem per hour (US DOE, 1999b, p. J-39). If railcars carrying high level nuclear waste to the intermodal facility near the City of Caliente are stalled in the City limits due to congestion at the intermodal facility or conflicts with other railcars moving through the area, residents could be subject to exposure levels beyond that evaluated by DOE.

In addition, the Kershaw-Ryan State Park is 0.4 kilometer (1/4 mile) from the proposed site for the intermodal facility (US DOE, 1999a, p. 3-121). This means the park is within the non-incident exposure zone designated by DOE. The close proximity of the park to the intermodal facility could result in additional exposure to local residents as well as travelers visiting the park.

The Nuclear Regulatory Commission estimates that in 99.4 percent of rail and truck accidents, no cask contents would be released. For the 0.6 percent of accidents that might result in a release of radioactivity, severity and location cannot be predicted (US DOE, 1999b, p. J-53). Residents of Lincoln County will be at risk for exposure to radiation in the event of an accident that results in a breach of a containment cask. DOE's analysis of radiological risks to populations and estimates of consequences of maximum reasonably foreseeable accidents does not address local, difficult-to-evacuate populations such as those in prisons, hospitals, nursing homes, or schools. Lincoln County and the City of Caliente will be required to develop and may need to implement an effective evacuation plan.

4.3 Sociocultural

4.3.1 Community Cohesion

There are a number of factors that come into play regarding the Yucca Mountain repository that could impact community cohesion. Impacted communities might experience standard effects associated with an influx of new residents due to new job opportunities. On the other hand, communities might lose population due to out-migration caused by stigma or by remote job opportunities at the Yucca Mountain site. Further complicating the issue is the hazardous nature of the repository, which brings an emotional component into play that is far greater than the siting of a more conventional facility.

If the repository, or the construction and operation of the intermodal facility and transportation routes does increase the population within some communities in Lincoln County, this may bring in new residents who have different life experiences, attitudes and outlooks about the community. This may reduce life satisfaction for long-time residents and put general strains on the community.

Issues pertaining to hazardous waste facilities including acceptance of compensation and payment of benefits are emotionally charged and known to be divisive. Lincoln County and the City of Caliente have experienced the impacts on cohesion within the community. These concerns will be pervasive throughout all phases of the repository project, from site characterization to closure.

Disagreements over the repository program have, and will likely continue to, stimulate internal community conflict. Those local residents highly concerned about risks associated with the nuclear waste storage program or who express opposition to the repository may be in conflict with residents who place a high priority on economic development and believe the repository system can be operated safely, can provide a capability to better manage existing risks associated with transportation of non-radioactive hazardous materials through the area and benefit the local economy.

Some local residents have been involved in lawsuits against the federal government regarding cancers that they believe resulted from weapons testing. Other individuals don't believe there is a problem.

Many residents and local leaders are aware of potential benefits involving the allocation of impact mitigation and/or compensation funds. They anticipate monetary compensation for the risks they will incur and mitigation measures that will provide their communities with things they have wanted and needed for a long time. Such mitigation measures might include improved roads, improved medical facilities, and emergency response crews, training and equipment. They want these mitigation measures to enable them to more effectively deal with the hazardous materials that are already being transported through the area (Mountain West, 1989).

Stigmatization of the area may have begun with site characterization and continue through the life of the project, resulting in feelings of dread and anxiety that could possibly lead to social consequences. These may include reduced community cohesion, increased crime rates and substance abuse, higher divorce rates and heightened requirements for human services (Intertech Services Corporation, 1994a, p. 2).

Attitudes toward, and perceptions of, the repository program could reflect significant deterioration in local residents' levels of community satisfaction and social well-being. Evidence derived from the rural community survey suggests that such responses could contribute to a variety of related behavioral shifts, including possible increased rates of out-migration, altered investment behavior, and/or increased political activity (Mountain West, 1989, p. 4-76).

Surveys conducted in Lincoln County indicate that residents give community satisfaction as a place to live one of the highest average scores (Intertech Services Corporation, 1994b). To the extent that the operation of the repository and ancillary transportation systems changes how residents feel about their community, this constitutes a negative impact.

Pride of community is important to community satisfaction. To the degree that the State of Nevada, Lincoln County, and/or the City of Caliente become associated with nuclear waste,

residents may receive increased negative signals about their hometowns from the rest of the country. These negative signals have the potential to erode community satisfaction.

4.3.2 Political Divisiveness

Political divisiveness can be viewed as an overt manifestation of the breakdown in community cohesion and/or in relations between communities. To the degree that the Yucca Mountain repository impacts community cohesion, we can expect this divisiveness will impact the political arena. These impacts will be felt for the duration of the project (from site characterization through closure and perhaps beyond).

As issues pertaining to the Yucca Mountain repository enter the political arena, the outcome of some elections may be influenced by candidate positions on the issue. To date there have been no special elections due the Yucca Mountain issue, but in the event that citizen's call for such an election, the cost to the County would be approximately $6,000 (Hogan, Corrine, 2001). Polarization of local elected officials over nuclear waste and waste transportation issues may constrain day-to-day governmental decision-making.

Although there have been no special elections to date regarding the nuclear repository, citizens have been asked to vote in regular elections on related ballot questions. In 1990 there were two questions regarding the repository in the general election held on November 3 (Hogan, 2001). The first question was:

> "Should we oppose the shipment of spent nuclear fuel or radioactive waste through the middle of our communities and over highway 93 or state route 375?"

The second question that citizens were asked to vote on was:

> "Should the Board of Lincoln County Commissioners continue to pursue a course of action that seeks to better understand and minimizes the risks, mitigates impacts and maximize potential economic benefits to Lincoln County associated

with a possible decision by the Federal Government to transport spent nuclear fuel and nuclear waste through Lincoln County?"

The presence of questions related to the repository on election ballots indicates that the political arena has already been impacted by the Yucca Mountain repository.

Another manifestation of the degree to which the repository is increasing political discourse within the community is the number of times repository related issues appear as an agenda item at City Council meetings and meetings of the County Commissioners. Agenda items related to the Yucca Mountain repository appear monthly at County Commissioner meetings and at least once a quarter for Caliente City Council meetings. Each time any issue pertaining to the repository is discussed in a public forum there are high levels of distress, strong emotions, and divergent opinions. The issue is very time consuming and diverts commission and council time and attention from other important issues.

Difficulties may also arise between Lincoln County and the City of Caliente, between Lincoln County and other counties, or between the County and the State of Nevada as divergent responses to the repository program are formulated and implemented. Of particular concern may be issues of procedural equity or distribution of risks and benefits.

In 1995 the State of Nevada engaged Lincoln County and the City of Caliente in a lawsuit over their differing views about recommendations made by the County and City to the Secretary of Energy. The City and the County passed a joint resolution informing the Secretary and the U.S. Congress that if they were to consider Lincoln County as a possible site for an interim storage facility for high level nuclear waste, certain conditions should be met. The State felt that this resolution constituted an "invitation" to host an interim nuclear waste facility and was contrary to State policy to oppose the storage of nuclear waste in Nevada. While the State ultimately dropped the lawsuit, the cost to the City and County to defend against the lawsuit was approximately $200,000 dollars. The tremendous cost in terms of personal distress for the persons being sued, the anxiety created in the community, and the barrage of media attention is impossible to measure.

Currently, there are several special interest groups that oppose the transportation and disposal of high-level waste and the presence of these groups may increase. If these groups plan protests within the County, it may result in business disruptions, stigmatization, and added public service costs (i.e. law enforcement) for the County and City (Intertech Services Corporation, 1994a, p. 9).

New government agencies may be formed due to an expansion in population or to respond to the unique needs of the Yucca Mountain project. Existing employees are burdened with additional work requirements. Oversight funding can not be used to cover costs of existing employees.

4.4 Socioeconomic

4.4.1 Employment

Employment opportunities will be created during all phases of the repository, including site characterization, transportation system construction, and operation of transportation related facilities. Construction of the intermodal facility, a rail spur, highway improvements, and operation of transportation facilities will result in the greatest additional employment in Lincoln County.

Since the initial proposal for utilizing Yucca Mountain as a high-level nuclear waste repository, there have been a number of impact studies based on an evolving set of assumptions. Four of these studies are noted below to indicate both the range of potential impacts to employment in Lincoln County and to highlight the uncertainty, when estimating the magnitude of impacts. These studies suggest that between 100 and 130 direct and indirect jobs would be created in Lincoln County through repository transportation construction activities. Construction employment would last up to 36 months. DOE further estimates that operation of the intermodal transfer facility in Caliente and related heavy-haul transportation activities would employ 90 to 110 County residents. DOE assumes that a significant number of transportation system workers would reside in Clark County. Lincoln County does not concur with this assumption. The County encourages DOE to maximize the number of County residents employed in repository transportation system construction and operational activities. The County believes that as many

as 150 direct and indirect jobs may be held by residents during construction and operation of the intermodal transfer facility truck transport system.

In a 1989 study the number of additional jobs in Lincoln County was estimated to be between 50 and 108. This same study indicated that during the caretaker phase the employment impact in Lincoln County would reduce to just eight jobs (Mountain West, 1989).

A 1991 study, based on DOE scenario's, projected peak employment impacts at 103, of which 35 would be direct project employees in the construction sector. The indirect employment impact was projected to be in mining (32), government (13), trade (12), services (6), fire (3), TCPU (1), and construction not directly related to the project (2) (Intertech Services Corporation, 1991).

A 1994 study estimated that peak construction employment would result in 38 new jobs in the Alamo Hiko area, 63 new jobs in Caliente, 11 new jobs in Panaca, and four new jobs in Pioche, for a total increase in employment of 116 persons (Intertech Services Corporation, 1994a, p. 19).

DOE's 1999 Draft Environmental Impact Statement for Yucca Mountain indicates limited job creation from repository construction and operation for Lincoln County residents. The DEIS identifies Lincoln County as part of the "region of influence" (along with Clark and Nye Counties) because of the possibility that DOE could build and operate an intermodal transfer facility there. The DEIS does not anticipate repository construction or operation employees originating from Lincoln County.

Construction and operation of a rail spur line or improvements to the roads for heavy-haul trucks through Lincoln County could result in employment for Lincoln County residents. For construction of the "Caliente" rail spur in Lincoln County, the DEIS estimates a 4 percent increase in employment in Lincoln County in 2007 (or during peak construction year) from baseline assumptions. The DEIS assumes that Lincoln County employment from the operation of the "Caliente" rail line would range from a 1.5 to 6.4 percent increase above the baseline. The other potential rail alignments that include Lincoln County result in similar employment figures (US DOE, 1999a, p. 6-57 through 6-70).

If DOE chooses the heavy-haul truck option, employment in Lincoln County from the upgrading of highways is estimated to be as much as 2.3 percent above baseline (US DOE, 1999a, p. 6-105).

DOE has assumed that all workers for the construction of an intermodal facility would come from Clark County. However, if the intermodal facility is sited near the City of Caliente, it is reasonable to assume that most of the workers would be residents (existing and new) of Lincoln County. DOE estimates total employment (direct and indirect) for construction of an intermodal facility would be 130 workers, plus 70 additional residents. DOE assumes that these employment and population increases would occur mostly in Clark County (US DOE, 1999a, p. 6-97). Impact assessments should include the possibility of construction related impacts in Lincoln County if the intermodal facility is located in the City of Caliente.

The DEIS estimates that the operation of the intermodal transfer facility in Caliente and the associated heavy-haul trucks on the "Caliente" route will result in an average of 240 direct and indirect workers. About 90 of these workers would reside in Lincoln County generating a total additional population of 125 (US DOE, 1999a, p. 6-107).

The DEIS estimates that operation of the "Caliente-Chalk Mountain" route would result in 110 workers who would reside in Lincoln County. Employment and population increases for Lincoln County would be about 4.0 to 5.0 percent of the baseline. For the "Caliente-Las Vegas" route, employment in Lincoln County would be about 100 workers with a total population increase for the County of 130 persons (US DOE, 1999a, p. 6-114).

Because of the recurring need to reconstruct highways used by the heavy-haul trucks, employment would increase in the years these projects occurred. During those years, employment (direct and indirect) in the region would increase by about 250 for a Caliente route (US DOE, 1999a, p. 6-107). DOE does not specify what portion of these workers would be from Lincoln County.

The results of a 1998 survey in Lincoln County indicate that unemployment could be as high as 19.7 percent, including both the unemployed and the discouraged unemployed. Of the survey respondents who indicated that they were employed part-time, 32.1 percent desired full-time employment. This same survey further showed that of the unemployed looking for employment, over 16 percent had a vocational or technical degree, a 4-year college degree or an advanced degree.

Due to limitations in locally available employment, many past residents (particularly younger persons) have left the area. This is in part due to the narrow economic base. Many of the survey respondents indicated that former household members would return to the area if employment opportunities were available at the Nevada Test Site or at Yucca Mountain. The survey results indicate that as many as 640 former household members from Lincoln County might return to the area if employment opportunities were available (Intertech Services Corporation, 1998).

4.4.2 Income

Income impacts will depend on the degree to which Lincoln County residents are employed for work associated with the repository, and the degree to which local manufacturing capabilities and resources are utilized by DOE in support of the Yucca Mountain repository system. Lincoln County resources and skills could be utilized for site characterization, transportation system construction, and operation of the intermodal facility and/or rail and truck movements between Caliente and Yucca Mountain. Lincoln County has been designated by the U.S. Small Business Administration (SBA) as a HubZone area. This might encourage manufacturers to locate in the County. Several small businesses in the County have been HubZone certified by the SBA.

It is important to note that the DOE assumes that a significant number of transportation infrastructure construction workers for a Caliente intermodal transfer facility and for heavy-haul related highway improvements would reside in Clark County. Lincoln County disagrees with this assumption and encourages DOE to make every effort to ensure that local residents are employed in both the construction and operation of Yucca Mountain related transportation systems located within the County. Lincoln County and the City of Caliente believe that as many as 150 direct

and indirect jobs may be held by residents during construction and operation of the intermodal transfer facility truck transport system.

County and City estimates place the number of direct and indirect jobs associated with the intermodal transfer facility and truck transport activities held by County residents at 150. Construction of the intermodal transfer facility is estimated to cost $24 million (1998 dollars) and require 1.5 years. Upgrading the Caliente route (U.S. 93 to SR 375 to U.S. 6 to U.S. 95 to the Yucca Mountain site) would cost another $120 million (1998 dollars) and would require 36 months to complete.

Construction of the Caliente intermodal transfer facility and related highway transportation system would occur over 3-4 years with real disposable incomes from construction approaching $1.6 million in 2010. The intermodal facility and related transportation system would operate for an estimated 23 years. Real disposable income from an operating intermodal transfer station in Caliente and operating heavy-haul trucks based in Caliente would rise throughout operations, starting at $2.6 million in 2010 and approaching $11.7 million in 2033.

To date there have been limited income impacts in Lincoln County and the City of Caliente. Limited local income has been created when DOE funded local positions with the County and City for repository oversight. In addition, DOE funding has been used by the County and City for consultants and research, although the majority of this income has not remained in the County. Repository oversight program funding began in 1984/85, totaling $30,000. Oversight funding increased to $596,000 by 1990/91, and was reduced to zero in FY95 (Intertech Services Corporation, 1996). (See section 4.5.7 on Local Oversight for details.) Since FY97, DOE oversight funding for the County has been approximately $600,000 per year.

4.4.3 Population

The population in Lincoln County has fluctuated over the years, corresponding to cycles in the mining industry and general economic opportunity. The historic population figures are shown in Table 4.1.

Table 4.1 Lincoln County Population 1970-2000

Year	Population
1970	2,557
1980	3,732
1990	4,430
2000	4,066

Source: Lincoln County Overall Economic Development Plan. Feb. 1991. Personal communication with the Lincoln County Grants office. 3/27/01.

Growth in County population resulting from the repository system, corresponding to increased repository direct and indirect employment, could approach 255 persons, with the peak impact expected during construction and the lowest impact occurring prior to construction and during the caretaker phase. The distribution among communities of one population projection scenario at peak impact, 2000 current population figures and the percent impact are shown in Table 4.2.

The DEIS population figures, based on employment from the operation of the intermodal facility range from 110-130 new residents, depending on which heavy-haul route is utilized. This figure does not encompass full population impacts, because workers from Lincoln County could be utilized in a broader range of capacities than just the intermodal facility.

Increases in population will result in additional construction of homes and community infrastructure and increased demand for retail goods and services in the affected communities. Results from the Lincoln County Economic, Fiscal, Demographic model developed by the University of Nevada, Reno Center for Economic Development (UNR-CED) (1999) to support County and City repository oversight initiatives suggests that as many as 30 new housing units may be required to support the 150 construction and operational workers associated with the intermodal facility at Caliente and related highway transportation system. Of these units, demand for mobile homes would be greatest. Over time demand for housing would shift to conventional single family dwellings with an estimated 45 homes required to house the transportation system operational workforce, related workers and their families.

Table 4.2 Current Population of Lincoln County Communities and Potential Increased Populations due to the Yucca Mountain Repository

Community Population	Current Population*	Repository Population**	Percent of Current Population
Alamo-Hiko	696	60	8.62%
Caliente	1,113	99	8.89%
Panaca	770	18	2.34%
Pioche	739	7	0.95%
Total	3,318	184	5.55%

* Personal Communication with the Lincoln County Grants office. 3/27/01

** Intertech Services Corporation. The Yucca Mountain High-Level Radioactive Waste Repository and Lincoln County: Characterization of Socioeconomic Impacts and Framework for Assessment of Effects. Submitted to the Joint City/County Impact Alleviation Committee. October 1994. P. 19

Alternatively, employment opportunities at the repository might encourage some residents to leave Lincoln County as they seek employment at and housing closer to the Yucca Mountain site. The effects of repository employment opportunities on relocation from Lincoln County may be dampened by the fact that County residents have exhibited a willingness to commute long distances to Las Vegas and the Nevada Test Site. Many Lincoln County residents currently commute daily or weekly to the Las Vegas metropolitan area or to NTS to work.

4.5 Public Infrastructure and Service

4.5.1 Emergency Management

The emergency management systems in Lincoln County and the City of Caliente will be impacted due to the Yucca Mountain repository. Transportation system construction, additional legal-weight or heavy-haul trucks on the roads, rail line construction activities, additional rail movements, increased repository related through traffic, an intermodal facility and a larger population base will all put additional demands on emergency management personnel (staff and volunteers) and equipment.

Current emergency response providers in Lincoln County include the following (Intertech Consultants and Foremaster, 1992):

- Caliente Volunteer Fire Department
- Pharanagat Valley Fire Protection District
- Pharanagat Valley Ambulance Association
- Pioche Fire Protection District
- Meadow Valley Ambulance Association
- Panaca Volunteer Fire Department
- Grover C. Dils Medical Center
- Nevada Highway Patrol
- Lincoln County Sheriff Department
- Lincoln County Office of Emergency Management
- Union Pacific Railroad
- Bureau of Land Management
- Department of Energy (no facilities located in Lincoln County)

Much of the equipment currently in service is outdated and unreliable and needs to be upgraded. For example, many of the service vehicles date to the 1980's and earlier.

In addition to providing service to local residents and businesses the fire departments are called upon to assist in the event of an incident at the five state campgrounds, the Caliente Youth

Training Facility, the Pioche Honor Camp, and with rangeland wildfires. Emergency situations in Lincoln County can create simultaneous demands on limited equipment and volunteer personnel.

The County, the City, and local volunteer departments will experience increased calls due to "normal" incidents associated with increased construction, traffic, and population. Currently, the Lincoln County Sheriff Department takes all local 911 calls and handles all necessary dispatching for police, fire and ambulance services.

In addition to enhancing capabilities to effectively handle "normal" incidents due to repository related activity, these same emergency management systems must also be capable of responding to an accident that involves a release of radiation into the environment. Lincoln County and the City of Caliente can expect that if there is a radiological accident within their jurisdictions their emergency response teams will be the first responders. Based upon current facility locations, additional state and/or federal support may not arrive for 3 to 4 hours.

At a minimum Lincoln County and the City of Caliente need to make the following preliminary and basic enhancements to their first response and emergency medical capabilities (Lincoln County/City of Caliente Emergency First Response and Medical Emergency Enhancement Plan, 1999):

1) Improvements to the local emergency communication (public warning) system
2) Equipping of emergency response vehicles for a radiological event
3) Training of emergency first responders and emergency medical staff
4) Hiring of emergency technicians and trainers

Preliminary estimates of the cost to upgrade the first response and emergency medical capabilities are estimated as follows (Lincoln County/City of Caliente Emergency First Response and Medical Emergency Enhancement Plan, 1999):

1) Installation and maintenance of radio repeaters in all police, fire, and emergency medical vehicles. Estimated cost: $2,000 per vehicle.
2) Installation and maintenance of community emergency warning sirens (capable of delivering varying signals). Estimated cost: $16,000 per site.
3) Design and implementation of public education program about the meaning of and appropriate responses to emergency warnings. Estimated cost: $50,000-$100,000 annually.
4) Equipping of existing emergency response vehicles (approximately 20) to enable situational assessment and safe-zone establishment and maintenance. Estimated cost: $750 per vehicle.
5) Hiring of two part-time emergency technicians/trainers. Estimated cost: $48,000 annually
6) Compensation to Lincoln County for 1/4 of the salary of the County's Emergency Management Director. Estimated cost: $15,000 annually.
7) Hiring of four full-time emergency technicians. Estimated cost: $175,000 annually.
8) Purchase and equipping of a hazardous materials response vehicle. Estimated cost: $80,000.
9) Annual training of emergency first responders and emergency medical staff. Estimated cost: to be determined.
10) Mobile command and communications center. Estimated cost: $300,000.

Many of the communities in Lincoln County, particularly Alamo and Panaca experience reduced water pressure during the summer months, with insufficient flow for fire fighting. The repository related construction and transportation activity could create additional demand for water and this may exacerbate the situation. Because of repository activities there will be a higher likelihood of fires, especially with additional trains traveling through dry grass areas. The water delivery systems of the affected communities should be improved to meet the additional demand without compromising service to existing residents.

Location of the intermodal facility adjacent to the City of Caliente and transportation of radioactive waste through Lincoln County will require development of an emergency evacuation plan and communication of this plan to local citizens. A current cost assessment is needed to facilitate implementation of enhancements to County and City emergency first response capabilities.

4.5.2 Emergency Medical

Emergency medical systems for the County hospital (Grover C. Dils Medical Center) located in Caliente, and the County clinic located in Alamo, will need to be enhanced in order to handle additional incidents. The hospital can expect additional in-takes due to accidents related to transportation system construction, additional legal-weight and heavy-haul trucks on the roads, additional rail movements, increased repository related through traffic, and increased population in the communities. The hospital must have the capability to respond to these accidents without compromising service to the existing resident populations.

The hospital and the Alamo clinic must also be capable of providing medical support in the event of an accident involving radiation contamination and/or a radiation release into the environment. In the event of such an accident patients may be contaminated by radiation which requires special equipment and procedures to protect the rest of the hospital and clinic, and staff and patients.

A radiological emergency response manual has been developed for the Grover C. Dils Medical Center in Caliente. The manual identifies staff training and equipment needs in order for the hospital to obtain capability to handle a radiation emergency (Grover C. Dils Medical Center, 1999). This manual does not identify costs associated with upgrading staff, hospital equipment and construction. A cost assessment is needed to enable successful implementation of the manual.

4.5.3 Schools

Any additional population in Lincoln County and the City of Caliente will include some school age children. If there is a repository-induced population of 108 persons, these students might be distributed among the schools in a manner similar to the current population as depicted in Table 4.3. Collectively, the repository system may induce an enrollment increase of 24 new students at Lincoln County schools. The cost per student incurred by the County (including elementary, middle and high schools) was $8,044 per student in 2000. This figure includes instruction, administration, building maintenance and operations, student support and staff support. This figure does not include capital costs for buildings and facilities. If the Yucca Mountain

repository does result in 24 additional students in the Lincoln County School District, the cost to the District would be $193,000 annually to educate these students. (The County currently receives $7,000 per student from the State of Nevada) (Jenkins, 2001). In addition, current capital costs per student have been estimated at $10,630.17(Bleak, 2001).

Table 4.3 Impact of the Yucca Mountain Repository on Schools in Lincoln County

School	Additional Students
Caliente Elementary	10
Meadow Valley Middle	4
Lincoln County High	10

Source: Intertech Services Corporation. Assessment of Facility Capacity and Student Loads. Prepared for the Lincoln County School District. September 2000. P.35

Current and under construction school facilities would be capable of handling the repository system related student population (Intertech Services Corporation, 2000). However, if this capacity is used to meet demands created by the repository, capacity will no longer be available to meet additional student population needs created by locally recruited industry.

4.5.4 Streets

The County road system is comprised of 3,447 miles of maintained roads. Significant changes to the County roadway system will not be required considering the relatively low vehicle miles traveled and the projected growth rates. However, if significant growth or land use changes develop, additional detailed analysis should be conducted.

If percent growth in vehicle miles traveled (VMT) is assumed to match percent growth in population due to the repository, both the Alamo-Hiko area and the City of Caliente can expect an increase in VMT that exceeds 8 percent due to repository activity. Table 4.4 compares current population figures with one scenario of anticipated growth due to the repository and presents a potential scenario for growth in VMT:

Table 4.4 Current Lincoln Population, Potential Repository Population and Potential Increases in local vehicle miles traveled (VMT)

Community Population	Current Population	Repository Population*	Percent of VMT Impact
Alamo-Hiko	696	60	8.62%
Caliente	1,113	99	8.89%
Panaca	770	18	2.34%
Pioche	739	7	0.95%
Total	3,318	184	5.55%

* Intertech Services Corporation. The Yucca Mountain High-Level Radioactive Waste Repository and Lincoln County: Characterization of Socioeconomic Impacts and Framework for Assessment of Effects. Submitted to the Joint City/County Impact Alleviation Committee. October 1994. P. 19

Local street traffic will be increased to the degree that population increases due to repository related activity. This will result in additional road wear, increased traffic, and decreased parking availability. Ultimately, repository system growth in VMT may contribute to the need for additional traffic control equipment, such as stop lights and new road signs. In recent years, the City of Caliente has budgeted between $175,000 and $200,000 for annual street maintenance. Maintenance costs associated with repository system traffic might exceed current annual maintenance expenditures.

4.5.5 Wastewater Treatment

Wastewater treatment facilities will be impacted due to standard direct and indirect effects of increased population. In addition the City of Caliente can expect an additional disruption if DOE chooses to build the intermodal facility at the location of the current wastewater treatment facility or directly adjacent to the wastewater treatment facility. Short-term demands by repository system construction related population will not cover the capital cost of allocating wastewater treatment capacity.

4.5.6 Municipal Water

Water supplies in Lincoln County will be impacted by the construction and operation of the intermodal facility, associated highway improvements and the construction of a rail spur. There

are potential impacts to ground water, surface water and water quality. Construction of an intermodal facility and the rail spur as well as improvements to the highway and road system for legal-weight and heavy-haul trucks will consume water for normal construction activities and for controlling fugitive dust. The effect will be to allocate a scarce resource to an undesirable activity, thus precluding its usage for desirable applications that would enhance the communities and the local economy.

In certain areas of Lincoln County, the granted or applied for water rights exceed estimated ground water perennial yield. The Nevada State Engineer's office has "designated" these groundwater basins, which means that it is no longer accepting applications for additional irrigation water.

DOE estimates that 30 percent of the rail spur option that it is studying between Caliente and Chalk Mountain is over designated groundwater basins (Including Lincoln and Nye Counties.). DOE estimates that construction of a spur rail line from Caliente would require 710 acre-feet of water and upgrades to the roadways for a route that passes by Caliente would require up to 100 acre-feet of water. DOE intends that this water be drawn from ground water resources U.S. DOE, 1999a, p. 6-68).

Pahranagat Valley is one of the few areas of the State of Nevada that has not exceeded its groundwater capacity (Intertech Consultants & Sweetwater Consulting Services, 1990). However, there are applications pending for the rights to this water.

The Town of Alamo water system is not adequate to serve existing residents and would not be able to tolerate additional demands without upgrades. Declining water levels and potential drying-up of shallower wells may dictate the need for improvements to the community water system in the near future, such as deepening wells. The system experiences severe pressure reductions during seasons of high water demand. There are currently no back up pumps or wells in the system, and it is questionable whether the system can provide adequate fire suppression flows during periods of high water demand. Storage capacity should be increased or additional wells developed (Intertech Consultants & Sweetwater Consulting Services, 1990).

Pioche has sufficient water rights to serve projected demands, including repository related demands. There are no documented water pressure problems in the Pioche service area (R.O. Anderson Engineering, 1991).

In Panaca, there are documented conditions of low water pressure. The existing pumping capacity at the lift station is insufficient to meet peak flow requirements and the resulting velocities within the force main are lower than acceptable standards. New aeration equipment is needed to yield an increase in the treatment plant capacity. The system is under a strain from the current population, and in need of improvement. An increase in population would amplify the problem (Intertech Services Corporation, 1994a, p. 28).

Existing irrigation and stock water wells may be impacted which could require deepening of wells or hauling water in from other locations. Loss of access to existing stock water sources may disrupt livestock movement and may impede implementation of Bureau of Land Management grazing plans.

The net result of the water situation in Lincoln County is that:

1) The repository activity will "compete" with local residents and businesses for a scarce resource;
2) The increased demand from repository workers and activities may force some communities to make large capital outlays to improve and/or enlarge municipal water systems, and;
3) Agriculture water users may find that their water supply is not reliable or adequate in quantity and/or quality.

Short-term demands by repository system construction related population will not cover the capital cost of allocating community water system capacity.

4.5.7 Local Oversight

In 1984, Lincoln County was formally invited (and funded) to participate in the Yucca Mountain repository oversight activities. The County and the City of Caliente signed a memorandum of

understanding to work together and formed the Joint City/County Impact Alleviation Committee (JCCIAC). Committee members are eight local volunteer citizens. The Committee meets approximately six times each year. In addition to regularly scheduled meetings, JCCIAC members attend numerous special meetings, such as energy management workshops, Nevada Nuclear Waste Commission meetings and the NWPO State and Local Steering Committee meetings. There are approximately 5 special meetings each year. Between all the meetings, 250-300 person hours each year are devoted to repository issues. If this time is valued at $30.00/hour, citizen volunteers donate between $7,500 and $9,000 per year in activities directed towards repository related activities. The JCCIAC has required additional allocations of time and effort on the part of some local government officials.

In July of 1988, the Secretary of Energy designated Lincoln County as an affected unit of local government (Intertech Services Corporation, 1994a, p. 3). Pursuant to Section 116(c)3 of the Nuclear Waste Policy Act, Lincoln County has a fiduciary responsibility as an affected unit of local government to undertake the following activities with respect to the repository system:

- Independent impact assessment
- Public information
- Impact monitoring
- Recommendations to Secretary of Energy

The County and City have hired the following staff to oversee repository oversight activity pursuant to designation as an affected unit of local government (Intertech Services Corporation, 1993a):

County:

1) Special Projects Administrator (1/2 time)
2) Coordinator/Information Manager
3) Clerical Assistant

City:

1) Coordinator

2) Clerical Assistant

These County and City repository oversight positions have been funded by DOE and do not constitute an additional fiscal burden on the local governments. They do, however represent impacts to the County and City that are accruing long before the actual repository construction begins.

Sections of each branch of the Lincoln County library have been set aside for books and publications about nuclear waste.

In 1993 the County developed and submitted initial partial payment-equal-to-taxes entitlement request to DOE. Should the DOE develop and operate an intermodal facility and/or a new rail spur line in the County, it will be necessary to prepare annual payment-equal-to-taxes requests to DOE.

Current oversight activities are for independent impact assessment, impact monitoring and public information and are funded by DOE under section 116(C) of the Nuclear Waste Policy Act. Table 4.5 lists annual funding for Lincoln County and the City of Caliente repository oversight program.

Table 4.5 Annual Funding for Lincoln County and the City of Caliente Repository Oversight Program

Year	Amount Funded
1984/85	$ 30,000
1985/86	$ 76,000
1986/87	$132,000
1987/88	$127,000
1988/89	$395,000
1989/90	$479,000
1990/91	$596,000
1991/92	$372,000
1992/93	$475,000
1993/94	$544,000
1994/95	$544,000
1995/96	$ -0-
1996/97	$ -0-
1997/98	$584,000
1998/99	$646,000
1999/00	$633,000
2000/01	$699,000

Source: Lincoln County Nuclear Waste Management Program: Impact Assessment and Alleviation Planning System Description and Status Report 1985-1996. June 1996. P. 7. Personal communication with the Lincoln County Treasury Office, May 29, 2001.

4.6 Local Government Finance

The County and City administer many services and facilities including, roads, recreation facilities, libraries, airports, landfills, general government, hospital, clinic, waste water treatment, water supply, emergency management, fire, and police.

Lincoln County and the City of Caliente both operate in an arena where local tax revenues do not cover the costs of the basic services provided. Both are dependent on intergovernmental transfers. In 2000 Lincoln County's total revenues were $2,840,640. Of this amount, $1,451,811 was received through intergovernmental transfers. Expenditures in the same year were $2,796,650.

The City of Caliente is in a similar situation. In 2000, revenues were $300,960 and expenditures were $276,426. Intergovernmental transfers accounted for $187,248 of the City's budget.

Population and population growth have the greatest influence on the distribution of intergovernmental disbursements. Lincoln County's slower relative growth affects the County's Supplemental City/County Relief Tax (SCCRT) allocations, caps on local ad valorem rates, and receipts from state shared revenues such as motor vehicle privilege tax, gas taxes, cigarette taxes and liquor taxes. All of these revenues are distributed on the basis of county growth in population and county growth in other revenues.

Possible restructuring of the distribution formulas from the State, and Lincoln County's slow growth relative to the other counties the state, put the County and City in a very precarious fiscal position. Even a small increase in demand for facilities and services will constitute an additional financial strain that neither the County nor City can afford to absorb.

An increase in population will cause an increase in demand for consumer goods and services, housing and rental space. Local businesses may benefit from more sales. More tax revenues will be generated for the government through sales taxes, property taxes, and possibly gas and other taxes. However, the local governments will face increased costs due to a larger population base that may not be matched by the increased revenue (Intertech Services Corporation, 1994a, p. 2).

Application of the Lincoln County Economic, Fiscal, Demographic model developed by the University of Nevada, Reno Center for Economic Development (UNR-CED) (1999), suggests that local government revenues and expenditures may be quite different than that estimated by DOE. Considering the 130 direct and indirect employees associated with intermodal facility construction assumed by DOE (thought to be a low estimate by Lincoln County), the UNR-CED model estimates additional local government revenues exceeding $727,000 will accrue to the City of Caliente during the two-year construction period. Much of this amount will be in the form of intergovernmental revenues (ie. supplemental city/county relief tax). As the facility goes into operation the DOE assumed 90 direct and indirect transportation workers (thought to be a

low estimate by Lincoln County) would result in increased annual property taxes from new dwellings constructed to house inmigrating workers. Expenditures by the City to provide public services and facilities to intermodal facility construction related workers and their dependents is estimated, through application of the UNR-CED model, at nearly $200,000 during the two-year construction period.

While the City of Caliente will likely see net fiscal benefits during the two-year construction process for the intermodal facility, Lincoln County may see costs of servicing construction related population exceed revenues accruing to the County. The UNR-CED model predicts that the 130-person direct and indirect construction workforce will provide an estimated $110,000 in new local government revenues during the two-year construction process. During this same two-year period, the County may have project worker related expenditures which approach $600,000. Nearly half of this cost would be for public safety. The UNR-CED model estimates the need for one additional law enforcement officer and up to three additional hospital beds to be required to service the intermodal facility construction workforce and their dependents.

Beyond direct fiscal impacts, Lincoln County and the City of Caliente may incur indirect fiscal impacts. An example might be the heightened costs of encouraging economic development in view of possible negative public perceptions of the region due to the intermodal facility and the downwind location from the repository. Another example of additional costs might be increased police and public safety costs if anti-repository protestors stage demonstrations in the County.

Lincoln County and the City of Caliente may face demands for expanded social services and facilities if nuclear waste causes additional fear and discomfort among citizens.

Of the various phases of the repository system, the construction of transportation infrastructure may have the greatest impact on Lincoln County and the City of Caliente. It is also the shortest phase and this makes the impacts particularly difficult for the County and City to accommodate. For Lincoln County or the City of Caliente to pass taxes or issue a bond in order to mitigate an "effect" there must first be a measured effect. By the time the local government collects the necessary revenues and mitigates the effect, a great portion of the effect may be over. Once the

impact has subsided, the County and/or City will be left with extra infrastructure and the burden of the remaining financing payments. For example, an increase in population may necessitate the need to expand a school. After the impact period expires many of the in-migrants leave the area, and the County and City will be left with an underutilized structure which will take several more years to amortize, creating an additional burden for the remaining population (Intertech Services Corporation, 1994a, p. 17).

4.7 Land Use

Almost 96 percent of the land in Lincoln County is administered by the federal government. The balance is owned by the State of Nevada, local governments, and private individuals. Only 1.8 percent of the total land area of Lincoln County is under private ownership. A significant amount of these private land holdings are agriculturally related. The largest amount of private land is along US 93 at the Lincoln/Clark County line and is intended for planned community developments.

The County is characterized by farming and ranching operations in the south (Pahranagat Valley from Alamo to Hiko), and in the north (Meadow Valley from Caliente through Panaca to Pioche).

The primary use on public lands is livestock grazing. Private land is used, primarily for agricultural purposes.

The construction of a rail spur would disturb livestock and wildlife movements and migratory patterns. The spur would also disrupt existing uses of the land, including hunting and grazing.

The agricultural sector may experience disruptions as rangeland is taken out of production to support rail construction activities. Livestock grazing may be further impaired as allotments are divided by the rail corridor, thus reducing the available animal unit months (AUM) of forage. Access to water sources available for domestic livestock and wildlife within the County may be inhibited by the extended transportation system. Wildlife and wild horses may be displaced and

redistributed in a manner that may result in localized overgrazing and intensified competition with domestic livestock (Intertech Services Corporation, 1994a, p. 25).

4.8 Transportation Accident Risk

4.8.1 Highway Transportation Accident Risk

The Yucca Mountain repository will result in increased transportation risk in Lincoln County, due to additional trucks traveling on the roads as well as additional vehicles from repository staff and contractors traveling to and from job sites. The additional trucks will be due to the actual shipments of nuclear waste and increased truck traffic bringing in materials for construction of the repository and related transportation facilities. The oversize and slow-moving nature of the heavy-haul trucks carrying the nuclear waste casks magnify the risk of an accident and the consequences. There will be increased radiological risks from normal (incident-free) travel as well as increased risks in the event of an accident that results in the release of radiation into the environment.

The climate in Lincoln County is typical semi-arid high desert. The elevation of the City of Caliente is 4,402 feet. The temperature extremes are from -20 degrees F in the winter to 109 degrees F in the summer. Average yearly precipitation is 9 inches, which includes 8 inches of snow. While the total precipitation of the region is classified as semi-arid, Lincoln County does have thunderstorms that can have high hourly rates of rainfall for a short period of time. Lincoln County lies in the path of warm, moist air masses from the Gulf of Mexico. Consequently, eastern Nevada, including Lincoln County, can expect an average of 20-25 thunderstorm days a year. Flash flooding often accompanies high intensity, short duration thunderstorms. Transport personnel moving into the region may not be aware of these extremes in terrain and weather, resulting in unsafe vehicular operating conditions.

Nationwide transportation system characteristics are different when compared to that of Lincoln County. The type of roads used for the shipments across the country will include major interstate highways with four or more lanes. However, the potential highway route considered in Lincoln County is a two-lane highway. Preliminary findings show that the magnitude and

distribution of risks in Lincoln County are different from the nation as a whole for highway shipments of spent nuclear fuel (Sathisan and Madhavapeddi, 1995). Table 4.6 notes several stretches of the road network in Lincoln County that have crash rates greater than the national average, expressed as the number of crashes per 100 million vehicle miles traveled (VMT).

Table 4.6 Crash Rates on Selected Segments of Highway in Lincoln County

Highway	Crash Rate per 100 million VMT
1995 National Average	348
1995 Nevada Average	374
Lincoln County	141
US 93	159
US 93 mile post 138 to 140	602
SR 375	211
SR 375 mile post 17 to 22	667

Source: University of Nevada Las Vegas, Transportation Research Center. Risk Assessment of Highway Transport and Intermodal Operations and Identification of Measures to Mitigate Accident Risks. January 2000. Pages 31 and 34.

The additional risk of highway accidents will depend on which transportation scenario is implemented. DOE is proposing two options for truck transport of the spent nuclear fuel casks—legal-weight trucks and heavy-haul trucks. The legal-weight route that DOE is presently considering does not pass through Lincoln County. The heavy-haul option would bring the casks in to Caliente on the Union Pacific mainline, where they would be transferred at an intermodal facility to heavy-haul trucks for the remainder of the trip to Yucca Mountain. DOE is considering three heavy-haul route options that pass through Lincoln County. However, two of the routes (the "Caliente" route and the "Caliente-Chalk Mountain" route) are almost identical and will be treated as such for assessment purposes. This route would leave Caliente on Highway 93 and then move onto Highway 375 until reaching the border with Nye County, for a total of approximately 90 miles in Lincoln County. The third route (the "Caliente-Las Vegas" route)

would leave Caliente and follow Highway 93 South to the border with Clark County, for a total of approximately 95 miles in Lincoln County.

The portion of the "Caliente" and "Caliente-Chalk Mountain" routes that travel on NV 375 between Crystal Springs and the border with Nye County are subject to frost restrictions that prohibit overweight loads during the spring thaw (generally February 1 through April 20) to avoid roadway damage. This area of the route would either be unavailable for transport during the restricted period, or would require significant pavement upgrades to allow overweight travel (Mushkatel and Planning Information Corporation, 1998).

The heavy-haul trucks would average under 30 miles per hour (MPH), on roads where the speed limit is 70 MPH for most of the route (University of Nevada, Las Vegas, 2000). According to the American Association of State Highway and Transportation Officials (AASHTO) crash involvement rates increase significantly when the truck speed reduction exceeds 10 MPH of that of the normal traffic flow. The crash involvement rate increases further as the truck-traffic flow speed differential increases (University of Nevada, Las Vegas, 2000). AASHTO requires a truck lane on grades when the truck speed reduction exceeds 10 MPH of the normal traffic flow.

According to the Nevada Department of Transportation (NDOT) there are 44 portions of US 93 between Caliente and Crystal Springs where the grade is greater than four percent. Oak Springs Summit (elevation 6,237 feet) and Hancock Summit (elevation 5,591 feet) are high mountain passes along this route. NDOT representatives believe that it will be critical to build climbing lanes in this segment of the route to accommodate the heavy-haul trucks and permit the normal flow of traffic. It is expected that a typical 125-ton shipment would travel the 42 miles of this route segment at an average speed of 10-15 miles per hour, requiring a total of at least three hours (Mushkatel and Planning Information Corporation, 1998).

NDOT believes that the grades along the portion of the "Caliente-Las Vegas" route on US 93 between Crystal Springs and the Border with Clark County are not steep enough to warrant passing lanes. However, turnouts every few miles to allow following traffic to pass the heavy-haul convoys. The heavy-haul trucks would weigh as much as 500,000 pounds. They would be

more than 100 feet long and 10-12 feet wide, and would stand as high as 15 feet above the road surface (U.S. DOE, 1999a, p. 6-5).

The three alternative routes for heavy-haul trucks are currently designated as Level of Service A, B, or C. These are considered good operating conditions in which minor or tolerable delays of service are experienced by motorists (U.S. DOE, 1999a, p. 3-139).

DOE estimates 11 one-way trips, carrying full casks to the repository and 11 one-way trips returning empty per week, for 24 years for a total of 27,456 heavy-haul trips through Lincoln County. This will result in an estimated 1,372,800 vehicle miles traveled of heavy-haul trucks carrying nuclear waste casks. Using 1995 Lincoln County crash rate of 141 accidents per 100 million miles, it is estimated that there will be two crashes involving heavy-haul trucks carrying nuclear casks in Lincoln County during the 24-year shipping campaign. There could be an additional two accidents involving empty heavy-haul trucks returning to the intermodal facility.

In an analysis of the transportation of hazardous materials, the Transportation Research Center (TRC) at the University of Nevada, Las Vegas found that an average of 12 shipments of hazardous materials per day currently travel through Lincoln County along U.S. 93(Sathisan and Madhavapeddi, 1995). If DOE chooses the rail to heavy-haul truck option, the number of hazardous shipments along U.S. 93 would more then triple.

Although scientific estimates of risk for an accident resulting in a release of radiation into the environment may be quite low, the risk is not zero. Area residents may perceive risks to be much greater then the scientific risk estimates. Failure on the part of federal, state and local emergency managers to implement effective hazard management techniques may exacerbate public perceptions of risk. Uncertainty of public reaction to incidents and accidents involving radioactive wastes may render local emergency response plans ineffective

Incidents involving trucks with nuclear waste shipments will result in impacts beyond standard accidents. To the degree that media amplifies the incident, even when there is no radiation

release, the economic and fiscal consequences can be expected to be much greater than from a similar accident without nuclear waste.

4.8.2 Rail Transportation Accident Risk

Rail transport will be attended by a different set of risks than highway transport. The total length of existing track in Lincoln County is 105 miles (Sathisan and Madhavapeddi & Lim, 1995). DOE is considering two potential rail spur routes that originate at the Union Pacific rail line near the City of Caliente and end at the Yucca Mountain repository site. The "Caliente" route is 319 miles long and the "Caliente-Chalk Mountain" route is 214 miles (U.S. DOE, 1999a, p. 6-52 & 6-65). These routes are almost identical through the portion of track that is within Lincoln County and are approximately 100 miles. Risks due to the transport of the nuclear waste casks will result from the operation of the trains on existing and new rail lines, the construction of a new rail spur line, and radiological risks due to the material being shipped.

The rail corridor through Lincoln County is in Rainbow Canyon from Leith Siding to the City of Caliente and follows the Clover Creek drainage to Islen Siding. The geology of the area has produced rugged terrain for a railroad system that results in 40% of the track alignment being curved. The track crosses 44 bridges and cuts through 14 tunnels. The terrain influences the safe operating speeds that can be sustained. In 1985 there were an average of 350 trains per month using the Union Pacific line (ETS Pacific, Inc. and Benkendorf and Associates, Ltd., 1986).

Thousands of trains use the Union Pacific rail line each year. While the risk of an accident between trains is remote, a two-train collision is a realistic scenario and should be considered. At this time, It is unclear if DOE would dedicate a spur line for shipment of radioactive waste or whether the line might be available to carry other commerce. (Lincoln County has proposed that DOE make the rail spur lines available for non-DOE freight, which would benefit the local economy.) If the spur line is shared with shipments of non-nuclear commodities, risk of collision must also be considered on the spur line.

Derailment is also a risk, due to the rough terrain and weather conditions. In the event of a derailment, collision, or other accident that results in a radiological release, residents of the City

of Caliente would be at risk. The wind blows out of Rainbow Canyon toward Caliente approximately 25% of the time. Wind velocity in the area averages 6.7 miles per hour fifty percent of the year. The prevailing wind direction and speed could create a potential fallout zone within and near the City of Caliente (Intertech Consultants, Inc, 1989).

The potential for sabotage exists along the entire rail corridor. Acts of sabotage involving destruction of bridges, tunnels or portions of the track can not be entirely discounted. Shipments might then be delayed and held in or near the City of Caliente.

During the waste emplacement phase, Lincoln County can expect impacts associated with the use of the existing rail line, which may be used to bring construction material to the repository.

During emplacement, DOE estimates 10 one-way train trips per week for 24 years, for a total of 12,480 train trips. Half would be carrying loaded nuclear casks and half would be returning with empty casks (U.S. DOE, 1999a, p. 6-50). Between 1979 and 1984 the derailment rate in Lincoln County shifted from being higher than the national average to lower than the national average. Between 1979 and 1981 the average derailment rate in Lincoln County was higher than the national average at four per one million kilometers traveled (621,370 miles). Between 1982 and 1984 the Lincoln County derailment rate was lower than the national average at less than one per million kilometers traveled (621,370 miles). The national average between 1981 and 1984 was approximately two derailments per million kilometers traveled (621,370) miles (Sathisan, Madhavapeddi, Lim, 1995, p. 10). The national derailment rate of 3.2 derailments per one million train miles traveled, suggests that up to four derailments might be expected along the rail spur between Caliente and Yucca Mountain during the 24 year emplacement phase.

Another risk for Lincoln County is the possible conflict of a new spur rail system with highway traffic. Some of the rail routes under consideration by DOE cross rural highways in Lincoln County. Grade separations will be required to reduce accidents and delays along the highway.

4.9 Public Perception and Stigma

With the potential of the repository less than 100 miles away from community areas and frequent shipments of radioactive waste passing through the area, stigmatization may affect people's perception of the quality of life in Lincoln County. Current residents may view the area as less attractive and this may ultimately lead to an out-migration of residents. Furthermore, retirees are usually attracted to rural areas due to the higher quality of life and personal security that they perceive to exist there. These potential retiree in-migrants may choose to locate elsewhere if they view Lincoln County as having a lessor appeal or quality of life due to its close proximity to the Yucca Mountain repository and host to the intermodal facility.

According to one study, the public associates the greatest degree of risk with technologies that exhibit the following attributes (Slovic et al., 1991):

- Risk not voluntarily incurred
- Risk not observable
- Risk unknown to those exposed
- Effects of exposure are delayed
- Risk is new
- Risks unknown to science

All of these characteristics apply to the transport to, and storage of, nuclear waste at the Yucca Mountain repository and the perceptions of the risk that the residents of Lincoln County might experience.

A study on perceived risk and stigma from the repository in Nevada found that (Slovic, et al, 1991):

> "The possibility that intense negative imagery associated with the repository may cause significant harm to Nevada's economy can no longer be ignored by serious attempts to assess the risks and impacts of this unique facility."

If stigma results in out-migration that causes a reduction in the population of Lincoln County or growth is not as rapid as anticipated, then many of the fiscal, school, wastewater, traffic, and other impacts would be substantially different from the standard population induced impacts outlined previously in this report. For example, if population decreases due to stigma, the school system will still have the same fixed costs, which will mean the cost per resident or household will increase. Likewise, if the population decreases, the costs of current roadway systems will have to be spread over fewer residents, raising the cost per person. This "opposite" effect due to stigma could have a significant impact on many functions of the City and County governments.

If there is an outflow of residents due to the effects of stigma, there could be a downturn in the local economy. Reduced local income could result in a lowered demand for goods and services and may lead to a decline in the number of employees, and possible business closures. This might result in fewer employment opportunities. In addition, an increase in residential vacancy rates may occur which may lead to reduced property values and lower housing costs within the County. This could result in a decline in rents collected by landowners, yet might also lower the cost of living for area residents. Some industries, such as construction, would also be affected by a declining population base. Demand for housing and infrastructure development would decrease, resulting in more unemployment. The ripple effect of a small reduction in population through the economy of Lincoln County could be significant (Intertech Services Corporation, 1994a).

Although considered a low probability, there is a chance for a transportation accident with significant environmental and health consequences, to occur within or near the County. Such an event could produce serious economic impacts. Accident consequences might be in the form of actual physical damage from the accident or from the economic disruption from a forced evacuation of the area and/or loss of use during clean-up. Business disruption may result in lost sales revenue and lost wages for employees. Depending on the length of the disruption, existing businesses may experience irreversible effects.

The Goiania event in Brazil, provides an example of how a relatively minor accident involving radioactive material could result in a chain of events affecting a geographic region much larger

than that of the actual impacts, disrupting social relations throughout a community and region. It also provided a classic example of the process by which the public's perception of risks, not the actual event or risk itself, can result in a wide array of painful and costly responses (Goble, 1994).

In the event of an accident involving release of radiation, the value of agricultural crops and land in the vicinity of transportation corridors may be affected. An incident involving little risk of exposure but receiving wide media coverage could result in stigma-induced reductions in land and commodity values (Intertech Consulting Services, 1994a, p. 26).

4.9.1 Tourism

Lincoln County is characterized by an abundance of outdoor recreational opportunities such as camping, fishing, hunting, water skiing, off-highway vehicle use, hiking, rock hounding, camping and backpacking. There are five state parks in Lincoln County—Spring Valley State Park, Echo Canyon State Recreation Area, Cathedral Gorge State Park, Kershaw-Ryan State Park, and Beaver Dam State Park. There are also two federally designated wildlife areas—the Desert National Wildlife Range and the Pahranagat National Wildlife Refuge.

In addition, there are numerous historic mining districts, prehistoric sites, historic sites from early settlements and silver mining. These include Indian camps, petroglyphs, mines, town sites, homesteads, and other historic relics. Most of these areas are unstudied, undeveloped and unprotected. These sites are part of the heritage of Lincoln County and represent potential additional attractions for visitors.

Lincoln County also has many buildings and structures that are of local significance. Such structures include historic homes, commercial buildings and public buildings. Many structures predating 1900 can be found in Panaca and Pioche. Several of the sites and structures may be eligible for listing on the National Historic Register.

As shown in Table 4.7, annual visitation to the five state parks in Lincoln County have shown a steady increase during the 1990s.

Table 4.7 Annual Visitation at State Parks in Lincoln County, Selected Years

Year	Park Visitation
1991	179,264
1992	174,560
1993	177,743
1994	n/a
1995	n/a
1996	n/a
1997	243,062
1998	233,464
1999	250,898

Source: Nevada Division of State Parks

In 1988, a Nevada Division of State Parks survey of state park visitors ascertained that each visitor to the five state parks in Lincoln County spent an average of $7.60 per day in Lincoln County (Intertech Services Corporation, 1993b). Adjusted for inflation this amount would be $10.70 in 1999. Although visitor spending habits may have changed over time, we can estimate that visitors to Lincoln County state parks spent $2,684,608 in Lincoln County in 1999. Since many visitors spend multiple days in a park, this figure may underestimate tourist spending. A decline in visitation may harm sales to local businesses, particularly gasoline and retail sales (Intertech Services Corporation, 1994a, p. 38). In addition there were 30,000 visitors to the Pahranagat National Wildlife Refuge (U.S. Fish and Wildlife Services).

If the State of Nevada becomes stigmatized due to public perception that it is the host to a hazardous waste site, tourism may fall off. Lincoln County is especially susceptible to the effects because it is downwind of the repository, part of the proposed transportation route, and a potential location for the intermodal facility. Media attention following a transportation accident, even one not involving a release of radiation, could greatly exacerbate perceptions of risk and related tourism impacts.

Literature suggests that tourism impacts from hazard events, may be short-lived and distance-dependent. However, these impacts would constitute a significant consequence for residents and businesses in Lincoln County. Tourism destinations within thirty miles of accident sites reportedly experience up to fifty percent sales and hotel occupancy declines lasting three to eight weeks. In the case of Three Mile Island, some evidence suggests that mild adverse impacts affected a minority of area businesses for an additional four to six months. Clustered near the Eastern edge of Lincoln County, all five State parks are located within the thirty mile impact zone corresponding to the mainline Union Pacific railway corridor (Intertech Services Corporation, 1993b). The prospect of a transportation accident near one of the County's tourist destinations is a real concern to local officials.

Reduced tourism would likely mean a decrease in local sales resulting in less sales and gasoline taxes being collected. In addition, lost revenues, which occur in other areas of the State of Nevada (i.e. Clark County) as a result of stigmatization will affect Lincoln County as shared tax revenues decline. Lincoln County receives several times more in sales tax revenue then is generated locally (mostly as a result of tourism driven sales in Clark County). Lincoln County may be faced with a declining revenue base, which becomes insufficient to cover costs. The County may be forced to lay off some employees and overburden others as it attempts to balance revenues with costs and the need for continued essential public services (Intertech Services Corporation, 1994a, p. 40).

4.9.2 Economic Development

Over the past 50 years there has been gradual erosion of Lincoln County's economic base. Recent years have seen an out-migration of younger persons and an in-migration of older retirees. The County has worked for many years to increase economic opportunities through an Economic Development Plan that highlights the benefits of locating business in Lincoln County. One undesirable effect of the repository may be to counter-act decades of effort to improve the image of the County both for business and for recreation and tourism. Tourism, farming and ranching all play an important role in the economy of the County, and all are subject to declines

due to a negative perception of the County as downwind of the repository or related to transportation of radioactive waste through the County.

Lincoln County has a long history of inequitable economic development and benefits with regard to DOE activities in Nevada. Historically, DOE nuclear weapons testing and radioactive waste management activities have imposed radiation exposure risks on Lincoln County while the majority of DOE-related economic benefits have flowed to Clark County. County economic development plans are intended to correct this inequitable distribution of benefits and burdens associated with various projects (1991 Lincoln County Overall Economic Development Plan). The repository should not exacerbate these trends.

Another concern may be the reluctance of new businesses to start up in the area. All major Lincoln County communities are located within 135 miles of the Yucca Mountain site and Rachel, Alamo and Hiko are within 100 miles of Yucca Mountain (Intertech Services Corporation, 1994a, p. 38). If stigma-related effects reduce investment in Lincoln County, this would constitute a significant negative impact.

Lincoln County and the City of Caliente seek to attract new residents, which will strengthen their community and economic base. Retirees from Clark County and other workers seeking a quieter life-style are a target audience for Lincoln County. If the City of Caliente becomes a host to an intermodal facility and/or waste is transported through Lincoln County, the attractiveness of the community may be diminished.

4.9.3 Real Property

There are a number of linked factors that could affect property values in Lincoln County and in the City of Caliente. Some factors could exert upward pressure on property prices, while other impacts may reduce property values. This situation highlights the need for close monitoring and quick implementation of a mitigation strategy.

To the degree that the existence of the repository and the intermodal facility increase the populations of Lincoln County and the City of Caliente, there may be upward pressure on real

estate prices. Alternatively, public perception of risks associated with the repository, the intermodal facility, and the rail/truck transit of the nuclear waste through Lincoln County could also have a noticeable detrimental effect on property values, with attendant effects on taxes and the fiscal health of the community.

The City of Caliente, in particular, may experience movements in property values, due to the close proximity of the intermodal facility and the fact that the rail-line bisects the community. Studies indicate that the whole community is within the distance from the rail line that could experience reduced property values due to transport of high level nuclear waste. A 1989 analysis of housing prices due to proximity to an environmental disamenity indicates that (Hunsperger):

1) Devaluation occurred out to a limit of approximately six miles.
2) The market did not distinguish between severity of the sites. For example, diminution in value was greater near one site that was considered less severe then another.
4) Loss in value was due to perception that in some cases was contradictory to scientific evidence.

Nuclear facilities have however, been shown to be related to increases in median housing values. A study for the U.S. Council for Energy Awareness has documented the econmic benefits of nuclear facilities on surrounding areas. In a study of seven communities hosting nuclear facilities, all seven were found to have experienced increases in average annual rates of growth in median housing values ranging from 7.2 percent to 10 percent between 1970 and 1990. During this same period, the United States as a whole saw average annual growth in median housing values climb just 6.7 percent (Management Information Services, Inc., April 1992). This study suggests that the presence of a nuclear facility does not dampen real estate values but may in fact encourage inflation at rates greater than the nation taken as a whole.

In another study of property values near the Rocky Flats Nuclear Weapons Plant survey respondents wanted extraordinary distances between themselves and the plant itself. Denver metropolitan area respondents said that the "closest distance to Rocky Flats" they would consider was a mean distance of 21 miles and a median distance of 15 miles. Sixteen percent of the

respondents would consider a house in the affected community without a discount. Forty-six percent would not trade distance and/or discounts of any size as compensation for a house located within six miles of Rocky Flats (Hunsperger).

A sample of Boston area housing prices between 1975 and 1992 found that the distance to superfund sites significantly impacted residential prices. (Gawande, Jenkins-Smith, 1999).

A study of property values along a nuclear transportation route in South Carolina, also found reductions in property values associated with proximity to the transportation route (Gawande, Jenkins-Smith, 1999).

Studies also indicate that it is the perception of risk that matters, even when public perceptions differ from those of expert opinion. The greater the perceived risk, the greater the expectation of harm due to the disamenity, and the greater the diminution of property values, regardless of expert opinions. Thus, while information matters, it is the translation of information into the public expectations associated with the disamenity that appears to affect housing prices (Gawande, Jenkins-Smith, 1999).

In a recent New Mexico court case (City of Santa Fe v. Komis) the prospect of public fears of radioactive waste shipments was found to be sufficient to warrant damages (Gawande, Jenkins-Smith, 1999). In this case, the City of Santa Fe argued that there was no loss of value to property that was adjoining property that was being purchased for the construction of a highway to transport nuclear waste to the Waste Isolation Pilot Project (WIPP) site near Carlsbad. (Hunsperger).

Alternatively, a study by Thrower et al. concludes that shipments of radioactive waste to the WIPP facility may not have had any adverse impact upon property values. In fact, this study documents the extent to which upscale residential development has occurred along and since construction of a route intended to by-pass the City of Santa Fe. The authors found that property in the vicinity of the route being used to transport transuranic radioactive waste was selling for in excess of $100,000 per acre. (Thrower et al., 2000)

Congress has also recognized the unusual status of communities along nuclear waste shipment routes and the potential for stigma to significantly impact property values. H.R. 1270 (105th Congress), the Interim Nuclear Waste Storage Bill, was amended by the House Commerce Committee to require compensation for land owners if the transport of the waste could be shown to have devalued their properties by at least 20%. Loss of value of 20% or more would require compensation, while losses of 50% or more would require DOE to purchase the affected property (Gawande, Jenkins-Smith, 1999). Although this provision was deleted from the bill prior to its passage by the House of Representatives, its initial inclusion signals a willingness on the part of the Congress to consider compensation for impacts, particularly those involving devaluation of real property.

If the public perceives the intermodal facility as similar in nature to a hazardous waste facility, the City of Caliente may experience reductions in property value. Conversely, income and employment associated with the facility may influence upward adjustments in Caliente property values.

5.0 Mitigation Options

5.1 Council of Environmental Quality Defined Impact Management Techniques

A mitigation measure is an action that is designed to provide a solution to an environmental problem. Mitigation is required under the regulations of the National Environmental Policy Act (NEPA). The Council for Environmental Quality (CEQ) has defined impact management techniques in 40 CFR 1508.20 as follows:

- **Avoiding** the impact by not taking certain action or parts of an action
- **Minimizing** impacts by limiting the degree or magnitude of the action and its implementation
- **Rectifying** the impact by repairing, rehabilitating, or restoring the affected environment
- **Reducing** or **eliminating** the impact over time by preservation and maintenance during the lifetime of the action
- **Compensation** for the impact by replacing or providing substitute resources or environments

The common thread that runs through these actions for mitigation is that the measure will result in physical change to the proposed action that will reduce or eliminate impacts. In practice, however, many agencies write mitigation measures that do not meet any of NEPA's definitions. Actions that do not comply with NEPA requirements include (Bass, Herson, 1993):

- "Consult with..."
- "Conduct further studies..."
- "Prepare a plan to mitigate..."
- "Strive to protect the resource..."
- "Monitor the problem..."

Lincoln County and the City of Caliente expect DOE to implement aggressive actions to mitigate all impacts within the County, stemming from the Yucca Mountain repository. In addition, due to the long-term nature of the project, its unique characteristics, and the potential for stigma

impacts that could produce an effect opposite to standard project related population and employment impacts, Lincoln County also expects DOE to implement detailed monitoring of environmental and social impacts. The monitoring should not replace mitigation actions where impacts can be determined in advance. In order that the monitoring comply with NEPA requirements, the County expects DOE to commit in advance to specific mitigation actions if impacts are detected and reach a predetermined threshold.

5.2 Recommendations for Mitigation of Impacts Within Lincoln County

5.2.1 Air Quality

Impacts to the air quality in Lincoln County are unavoidable, but they can be completely mitigated. In order to understand the full impact to the air quality, DOE should implement a comprehensive monitoring system before construction begins, during construction and throughout emplacement. This will allow DOE and County, and City officials to assess the extent of air quality changes without resorting to guess-work, and will minimize potential disagreements. Although the degradation to the quality of the air may not exceed the National Ambient Air Quality Standards, any degradation to air quality is an allocation of a valued resource to an undesired activity and a burden to Lincoln County and the City of Caliente.

A commitment to reducing the extent of degradation to air quality would start with policy to reduce emissions, including:

1) Requiring all trucks, other vehicles, and locomotives associated with the repository to use the best available emissions control technology and to undergo regular emissions control testing to meet stringent standards.
2) Setting strict limits on truck and locomotive idling.
3) During construction of the intermodal facility, new rail lines and road improvements or maintenance, implement practices to minimize fugitive dust, including spraying roads, construction sites, and earth movement sites with water.

In addition to a commitment to avoid emissions associated with the transport of nuclear waste through Lincoln County, DOE could implement programs to off-set the additional unavoidable emissions. The goal of an off-set program would be to keep total emissions (both repository and non-repository) at or below current levels. Examples of such programs include:

1) Help for businesses and residences (existing and new) to control emissions at no additional cost to the property owners and tenants. This could include assistance with emissions control technology, and the purchase of more efficient appliances and education about techniques for improving efficiency.
2) Providing assistance to residents to insulate their homes, purchase more efficient appliances, and improve overall efficiency.
3) Assistance for local citizens with emissions control technology on their personal vehicles and general maintenance to reduce emissions with an emphasis on the "high emitters."
4) Assistance to County and City in paving dirt streets.
5) Assistance to County and City with landscaping of barren areas.
6) Reduction of non-repository vehicle trips through enhanced pedestrian and bicycle trails.

5.2.2 Hydrology

In order to minimize impacts on water quality in Lincoln County, DOE should commit to maximum efforts to reduce non-point source run-off, point source run-off, and spills. Measures that should be implemented to mitigate impacts include:

1) Ensure that trucks and locomotives associated with repository activity are maintained properly, including repairing oil and hydraulic fluid leaks, radiator leaks, and all other potential sources of environmental contamination from all vehicles associated with the repository project, whether directly owned by DOE or under contract.
2) The intermodal facility should be designed to capture all potential sources of water pollution, so that day-to-day activities and unusual events, such as spills, do not impact the surrounding environment and water.
3) In the event of a spill at a construction site or during transport, clean-up protocol should be in place and activated immediately.

Construction of the intermodal facility, the rail spur, and improvements to existing roads may impact perennial and ephemeral streams and natural water flows from rain and snow melt. Mitigation measures include:

1) The intermodal facility, rail spur line, and any additions to roadway surfaces should be designed to mitigate against long term hydrologic impacts.
2) Design of all culverts and crossings of streams to minimize the potential for ponding, erosion, and sedimentation by matching the existing topography.
3) Prepare a maintenance plan to ensure all culverts remain clear of debris to avoid potential flooding and alterations to stream flow.
4) During construction, best practices should be utilized to reduce temporary or permanent alterations to surface water, including streams, standing water, and flow patterns from rain or snowmelt.

Mitigating water quantity impacts includes ground water supply as well as water for the communities, business, farming, and ranching activities.

1) If it is determined that withdrawing groundwater for construction and dust control will have a detrimental effect on ground water in Lincoln County, DOE should avoid this impact by trucking in the water from another more abundant source.
2) Provide funds to the communities of Alamo, Panaca, and Caliente to upgrade and improve their water systems including wells, pumping, and storage capabilities to off-set the additional demands that will be made by new permanent and temporary residents, servicing the intermodal facility, and servicing additional through traffic.
3) DOE should consider leasing unused water rights from existing right-holders rather then seeking new water permits and the construction and pumping of new wells.

5.2.3 Noise

1) Contractors should be required to use proven techniques to reduce noise in the surrounding environment during construction.
2) Time of day restrictions on construction activity.
3) Time of day restrictions on truck and locomotive operations involving operation of a possible intermodal facility.
4) Other restrictions on truck operations, including idling and the use of air brakes in certain zones should be implemented to reduce noise impacts on local residents.
5) Consider the strategic use of sound barriers to minimize the distance that noise will travel.

5.2.4 Viewshed

1) Design of the intermodal facility site and structures should blend with the natural environment and fit with the local architecture.
2) Vegetation, such as native trees and scrubs, should be planted on berms around the intermodal facility to soften the visual impact.
3) Protocol to minimize cuts and fills and areas that will be cleared of vegetation during construction.

5.2.5 Radiation Exposure

1) For transportation and intermodal facility workers, utmost care should be taken to ensure that radiation dose badges are being used correctly and workers receiving higher than acceptable levels of radiation should be reassigned to work in areas with less risk of exposure.
2) If workers are regularly exceeding dose limits, DOE will need to reexamine procedures, to reduce exposure.
3) Doctors and medical staff in Lincoln County and the City of Caliente should be trained to identify radiation sickness and the hospital must have the capability to isolate patients and treat for radiation exposure.
4) In order to avoid risk of exposure for the residents of Lincoln County, an intermodal facility, if constructed, should be sited at an appropriate distance from residential or

public functions. DOE should further isolate the inter-modal facility with physical barriers. Special care should be taken that children cannot climb fences or otherwise put themselves into close proximity of the intermodal facility.

5) Limits should be placed on the number of casks allowed at the intermodal facility at any one time.

6) Transport protocol should be designed to ensure that the intermodal facility does not become a holding place in the event the repository is temporarily unable to accept additional casks. (ie. departures of train shipments must be stopped at the place of origin, if the repository cannot accept casks.)

7) Studies indicate that more than 90% of the risk of exposure to the population along the transportation corridors is during stops. As stop time increases so does the exposure to the population. This indicates that controls on the duration and location of stops are an important technique for reducing exposure to radiation. Stop times in populated areas should be minimized and designated safe stopping areas for rail and truck transport should be isolated from communities.

8) Increased speeds were also found to reduce exposure. For both truck and train shipments, DOE needs to assess the trade-off between increased speeds to lower radiation exposure and the risk of an accident that increases with travel speed. The optimal operating speed should be determined and adhered to.

9) Rail shipments were found to result in lower exposure levels to the population than truck shipments. DOE should consider this risk factor in determining the final modal mix and routes for the nuclear casks (Sathisan, Madhavappeddi, Lim, 1995).

10) County and City officials should have independent oversight over the Federal radiation monitoring. This includes funding for staff to perform independent monitoring and obtain and maintain necessary equipment.

11) DOE should conduct a thorough baseline and cumulative assessment of radiation levels and exposure in Lincoln County. This baseline study should include risks from direct exposures from atmospheric tests, direct exposures from unconfined underground tests, risks from future migration of radioactivity deposited on the surface or underground at the NTS. The study should include the inventory and potential future releases of radioactive materials at the test site from all tests, the transport by air and water of

radioactive material, the human exposure and uptake to radioactive material, and the expected health consequences of the exposures. Without this complete assessment of past exposures, risk, and health consequences, DOE cannot know that the Yucca Mountain repository is not increasing exposure levels to residents of Lincoln County.

12) DOE should execute advance agreements with Lincoln County and the City of Caliente regarding compensation that will automatically go into effect if background radiation levels exceed an agreed upon level. This "bright-line" approach assures the residents of the County and City that they will be compensated for harm that may be inflicted on them and it reduces the likelihood of long drawn-out litigation between DOE and citizens in these communities.

13) Guarantee that DOE will bear the full cost of clean-up activities if radiation is detected in Lincoln County, using best available clean up techniques and equipment.

14) DOE should conduct an ecological risk assessment to determine the radiological risks to the wildlife and vegetation directly adjacent to the transportation corridors and the intermodal facility.

5.2.6 Sociocultural

5.2.6.1 Community Cohesion

Literature indicates that trust, control, and self-determination are important to increased comfort levels with hazardous facilities. For example, in some European communities if they accept a repository they are then granted a greater degree of control over operations as well as local participation in decisions and monitoring functions. (Joint City/County Impact Alleviation Committee, 1990). To the degree that DOE implements greater local participation, this will mitigate negative impacts to community cohesion. Residents will have a much greater level of trust in fellow community members who are participating in decisions and monitoring the Yucca Mountain repository. Strains on community cohesion can be reduced if there are clear benefits to the community that are available to all residents.

1) DOE should continue to assist Lincoln County and the City of Caliente with funds to hire experts and conduct independent oversight during the characterization, construction, and emplacement phases of the repository.

2) DOE should continue to assist Lincoln County and the City of Caliente with funds to enable them to monitor the impacts of the repository on key socioeconomic indicators in Lincoln County, such as population, jobs, and income.

3) DOE should commit to compensation involving enhancement of community quality of life through investments in a new community center, public park, public pool, or other facilities that are valued by the community.

4) DOE should provide significant unrestricted compensation for strains on community cohesion.

5.2.6.2 Political Divisiveness

1) DOE should compensate the County and City governments for costs associated with special elections and increased time that elected officials and local government employees may need to put towards issues pertaining to the repository. Compensation should be retroactive to the initial date at which impacts can be measured.

2) DOE should compensate the County and City governments or the costs of the 1995 lawsuit initiated by the State of Nevada.

3) DOE should commit to providing compensation for any future litigation or costs incurred by the local governments or individual officials related to the exercise of their duties, pursuant to designation as an affected unit of local government.

4) DOE should provide significant unrestricted compensation for political divisiveness.

5.2.7 Socioeconomic

5.2.7.1 Employment

Studies indicate that there is surplus labor in the County that could be tapped for work at Yucca Mountain. In Lincoln County communities (Alamo and Rachel) located nearest to Yucca Mountain, the percentage of survey respondents in 1990 indicating that they would be interested in employment opportunities at the NTS was at 50 percent in Alamo and 45 percent in Rachel.

The survey found 41.8 percent of respondents from as far away as Caliente were also interested in employment opportunities at NTS.

In addition, of the 437 households that responded to the survey, 165 believed that former household members would return to the area if employment opportunities were available on NTS or Yucca Mountain. This represents a significant labor force readily available in Lincoln County for Yucca Mountain repository system construction, operations, and decommissioning.

The following measures would help ensure that employment opportunities and benefits are maximized in Lincoln County:

1) A local job training program will enhance employment opportunities for residents of Lincoln County. The type of skills required for repository work as compared to the capabilities possessed by County workers will affect the chances of local workers being used and in what capacity. These skills include management, engineering, craft, equipment operators, etc.
2) DOE could locate ancillary activities in the County. At peak employment, DOE anticipates requiring nearly 800 clerical/office workers to support site characterization activities at Yucca Mountain. Through the use of currently available data transmission technologies (i.e. modems, internet access, etc), certain "back office" functions could be conducted at locations in Lincoln County (Intertech Services Corporation, 1994b).
3) There is an issue of whether the jobs available will be union or non-union positions. Because union hiring halls are typically located in metropolitan centers, rural workers often find it difficult to obtain union jobs. Consequently, if union labor is relied upon for Yucca Mountain work, employment opportunities for Lincoln County residents may be limited. DOE should implement hiring policy that gives Lincoln County residents a fair opportunity to apply for the available positions. Unions should be required to provide in-community based training programs.
4) DOE should commit to local procurement policies within the State of Nevada and for Lincoln County.

5) Due to the long distance between communities in Lincoln County and the repository, DOE should provide a busing program to bring Lincoln County residents in to the repository for work. If the Department of Defense were willing to once again allow access through Gate 700 (which is located near the northern edge of the NTS), Lincoln County workers would have relatively convenient access to the Yucca Mountain project.

6) Rachel's close proximity to these federal installations, closer than Las Vegas Valley, suggests the possibility of providing residential housing and services for those federal employees and contractors desiring an alternative to the long commute from the Las Vegas Valley.

5.2.7.2 Income

1) Procurement policy that would increase purchases of goods and services from within Lincoln County would benefit businesses and their employees in Lincoln County and the City of Caliente.

2) Appropriate wage structures and salary compensation for employees of the repository. Yucca Mountain repository jobs utilize limited community capacity (i.e. housing, roads, water). If adequate salaries are not provided, opportunity costs to the community may be exacerbated.

5.2.7.3 Population

Due to the unique nature of the repository, population impacts are difficult to forecast and should be monitored closely, with a commitment from DOE to provide adequate compensation if adverse impacts are detected.

Population growth in Lincoln County communities will place an additional strain on government services, such as wastewater treatment, water, public safety, roads, etc. These are services that the local governments are required to provide, although the repository is an involuntary project and may reduce the community's ability to provide services for desired projects. Mitigation, including compensation, for these additional demands are discussed under section 4.7: Local Government Finance.

Conversely, if there is out-migration due to stigma effects, or if the population does not experience the anticipated growth, there will also be negative fiscal impacts because the County and City will need to absorb fixed tax supported outlays on a smaller population base. Mitigation, including compensation, under this scenario is discussed under section 4.10: Public Perception and Stigma.

5.2.8 Public Infrastructure and Service

5.2.8.1 Emergency Management

Emergency management systems will need to be upgraded to handle additional accidents associated with increased traffic flow and population and to handle an emergency involving the release of radioactive material into the environment. Lincoln County and the City of Caliente must have the capability of handling this additional burden without compromising service to existing communities or to visitors and tourists. The following measures would serve to mitigate the effects of the additional burden:

1) Grants to upgrade current emergency response equipment to handle additional emergency situations (including fire and medical response capabilities) due to a larger population base and accidents associated with the construction and operation of a rail spur line, the intermodal facility, and roadway improvements for the heavy-haul trucks.
2) Grants to purchase the necessary equipment to enable the County and City to provide early response to handle an incident involving the release of radioactive material into the environment and human contamination. Preliminary costs are estimated under Section 3.5.1: Emergency Management.
3) Initial funding to expand the emergency response staff and continuing grants to maintain the additional staff.
4) Funding to enable ongoing training for the emergency management personnel, and to cover special training for radioactive material and evacuation/crowd control training.
5) A contingency for grants to cover additional staff time and equipment in the event of a radiological emergency.
6) Cross training and reciprocal agreements with other impacted counties in Nevada.

7) Grants and aid in developing and publicizing an evacuation plan for the City of Caliente and surrounding communities. The evacuation plan should include route planning, emergency personnel coordination, public education, acquisition of emergency signal and communication equipment, acquisition of vehicles needed for evacuating students, hospital patients, elderly persons and others with special needs.

In addition to financial support and training, DOE needs to take a proactive and positive role in helping Lincoln County, the City of Caliente, and other similar sized communities along the transportation route with emergency planning for a radiological event. This includes:

1) Providing guidance for appropriate levels of community preparedness, training, equipment, and response procedures.
2) Clarifying responsibilities in response planning between the federal, state, and local governments, as well as between federal agencies, such as FEMA, DOE, and EPA.
3) Taking responsibility to ensure (perhaps through certification training) that the local governments have the necessary training and equipment to handle an accident involving a radiological release.

Back-up emergency help is at the present a long way off. Three hours is the minimum drive time for additional emergency personnel and equipment to arrive from Las Vegas. Under these circumstances, DOE needs to evaluate:

1) If there are upgrades to dirt roads or cut-through routes that could be established which would reduce the drive time between NTS, Las Vegas and the City of Caliente. For example, improvements to Kane Springs Road.
2) Which critical heavy or large equipment should be stored in Lincoln County so that personnel being flown in via small plane or helicopter would have the necessary equipment without the delay of waiting for trucks to arrive.
3) Strategically locating DOE emergency response capabilities along transport routes.

5.2.8.2 Emergency Medical

Emergency medical systems will need to be upgraded to handle additional accidents associated with increased traffic flow and a larger population base. In addition, the hospital will need to be able to handle an emergency involving the release of radioactive material into the environment and human contamination. The hospital must have the capability of handling this additional burden without compromising service to existing communities. The following would serve to mitigate the effects of the additional burden:

1) Funds to upgrade hospital facilities and to accommodate the additional demands for basic service.
2) Grants to hire additional staff to accommodate increased demands for basic services.
3) Funds to modify hospital facilities to provide the capability for radiological quarantine in the event that persons contaminated with radiation are admitted for initial treatment.
4) Funds to purchase equipment and supplies for use during a radiological event.
5) Funding to allow for ongoing training in radiological safety procedures and treatment for the hospital staff.
6) A contingency for grants to cover additional staff time in the event of a radiological emergency and to replace contaminated or outdated equipment.
7) Cross training and reciprocal agreements with other impacted counties in Nevada.
8) DOE should develop a standard of competency for radiological medical treatment and ensure that staff in communities along the transport corridors meet the minimum requirements (perhaps through certification training).

5.2.8.3 Schools

1) DOE should provide the Lincoln County School District with funding to monitor for impacts and changes in student populations and demands due to the repository system.
2) DOE should reimburse the School District for the cost of educating additional students induced by repository system construction and operation.
3) DOE should commit in advance to provide funds to expand school facilities, purchase equipment, and hire additional staff if monitoring indicates that the school system is experiencing additional demands due to the repository system.

5.2.8.4 Streets

1) Grants to cover additional maintenance and repair costs for local streets, due to the increased population base and additional repository related traffic.
2) Grants to cover additional safety mechanisms such as street lights and stop signs that may be necessary to accommodate increased traffic flows.
3) If heavy-haul or legal-weight trucks will be traveling over County and/or City maintained roads, DOE should provide the County and/or City resources to cover the additional costs for road maintenance.
4) Safety at existing and new railroad crossings would be enhanced if they were modified to reduce potential contact between cars and trains. If complete grade separation at existing crossings is not possible, railroad crossing and signals should be evaluated for possible enhancement and upgrading. A communication system between the railroad and the local emergency first responders should be enhanced.

5.2.8.5 Wastewater Treatment

1) If DOE builds an intermodal facility at or directly adjacent to the current wastewater treatment facility for the City of Caliente, DOE should bear the full cost of moving the existing facility to a new location, including building new structures, treatment facilities, roadways, and sewer collection lines. The new facility should result in no additional life-cycle costs to the City of Caliente.
2) Repository system related population will put additional demands on the wastewater treatment facilities in the communities of Lincoln County. DOE should fund facility upgrades and expansions as necessary.

5.2.9 Local Oversight

1) Funding for local oversight, as specified in Section 116(c) of the Nuclear Waste Policy Act, will need to continue for the duration of the repository program (construction, emplacement, pre-closure monitoring) for independent local oversight and monitoring.

5.2.10 Local Government Finance

1) Grants to the local governments to cover the added cost of providing service and facilities for the new residents that locate in Lincoln County and the City of Caliente due to repository related jobs.

2) Grants to the local governments if repository related impacts (both standard and stigma induced) require additional staff.

3) Grants to the local government to enable establishment and staffing of a fiscal impact monitoring capability.

5.2.11 Land Use

1) Direct compensation to land owners for portions of their land that are put out of commission—temporarily or permanently, due to construction and operation of the transportation corridor for the nuclear waste. This includes farming and ranching, game hunting, and all other uses of the land that might be constrained or permanently changed.

2) Seed areas that are disturbed to produce additional forage for domestic livestock and wildlife.

3) If DOE or its contractor activities disturb drinking water sites, DOE will drill additional wells or otherwise ensure that water is available in at least the same quantity and quality as before the repository.

4) The number and location of borrow pits and fill areas should be sensitive to local land uses and not constrain or disturb previous activity.

5) Prior to construction, DOE and its contractors will develop a plan acceptable to Lincoln County to minimize impacts to livestock grazing activities.

5.2.12 Transportation Accident Risk

5.2.12.1 Highway Transportation Accident Risk

1) DOE should evaluate the safety characteristics of the two-lane roadway links that could be used for shipments to the proposed repository. In particular, this should address causal factors of accidents and infrastructure related issues. For example, passing lanes or turn-outs might help enhance safety on these roadways. Thus an investigation of the

relationship between traffic volumes, traffic composition, and safety could help identify the potential benefits of making infrastructure improvements. In areas where the accident rates are high, special passing lanes or turnouts could be provided to bypass the traffic, and thus reduce risks due to potential collisions.

2) DOE should bear the full cost of additional safety mechanisms for the transport of heavy-haul or legal-weight trucks through Lincoln County, such as widening highway shoulders and upgraded railroad crossings

3) DOE should construct a special lane for the slow moving trucks wherever the trucks are moving at speeds 10 MPH or more below the speed limit.

4) Lead and follow cars for the slow moving trucks will enhance safety.

5) Special lights and automatic signs along the transport route to warn drivers in the vicinity of slow moving trucks should be used.

6) Local control and management participation in accident assessments, especially in checking for radiation releases.

7) Elimination of at-grade railroad crossings on public roads and highways.

8) Special signage on private road crossings

9) Drainage structures must be designed to accommodate extreme conditions, including 100-year storms.

10) Upgrades to County and City snow plowing capacity and providing funds for additional snow removal personnel, so that the trucks carrying the waste casks can move through the County and City in a timely and safe manner.

5.2.12.2 Rail Transportation Accident Risk

Implementation of the following mitigation measures would serve to avoid or minimize all potential impacts of the rail transport of nuclear waste along the existing rail corridor and on a new rail spur:

1) Establish and fund an organization to coordinate and plan for high level nuclear waste train movements through the rail corridor. This organization, which could be formed from an existing county organization such as the sheriff's department, would monitor, detect and react to potential sabotage in the corridor.

2) Before the rail shipments containing the nuclear waste begin and at regular intervals thereafter, a complete inspection of the rail corridor should be conducted and repairs made. The result of the existing "rugged" alignment with high quantity of curved track is a railroad that requires constant inspection of track for gage widening in the curves. The consequence of not maintaining proper gage is an increased potential risk of derailment.

3) DOE should evaluate additional safety measures and infrastructure safety standards for the rail transport (rather then relying on federal safety standards), because of the high consequence nature of a rail accident with spent nuclear fuel. DOE should be responsible for the costs of upgrading equipment and maintaining the additional safety standards for the duration of transport of the spent nuclear fuel.

4) The railroad lines, switching equipment, and lights should be inspected regularly for regular wear and repairs should be made promptly.

5) A system for detecting natural hazards, such as land slides and floods should be implemented. This could be a pilot train or pilot vehicle that would travel the rail corridor two to five miles ahead of the train carrying high level nuclear waste casks, or sensors and monitors on the tracks to warn of natural hazards.

6) Rail crossings for existing rail lines as well as rail spurs to be grade separated.

7) Wooden ties should be replaced with concrete ties.

5.2.13 Public Perception and Stigma

5.2.13.1 Tourism

1) Implement a comprehensive monitoring system to detect if there are negative impacts on tourism in Lincoln County due to the intermodal facility, the downwind location from the repository or the existence of the nuclear waste transport corridor. The monitoring system should be capable of detecting changes in tourism under no incident conditions as well as in the event of an incident.

2) Set in place clear milestone impact thresholds at which predetermined mechanisms for compensating businesses affected by drop in tourism, both short term and long term would be implemented. The compensation package should address both no incident scenarios as well as incident-related declines in tourism.

3) Grants to Lincoln County to fund a marketing campaign to attract additional tourists in the event that the repository results in a drop in tourism.

4) DOE should provide funds for Lincoln County to develop and implement a contingency marketing plan in the event of an incident that receives wide-spread media attention that causes a detrimental effect on tourism.

5.2.13.2 Economic Development

Lincoln County has invested considerable resources in understanding and promoting economic development within the County. For example in 1994, the County supported the following economic development studies:

- *Economic Trends and Development Strategies for Lincoln County,*
- *Retail Sales Analysis for Lincoln County, Nevada,*
- *Economic Impact Model for Lincoln County, and*
- *Industrial Fiscal Impact Model User's Manual for Lincoln County*

Each year, the County and the City develop an updated comprehensive economic development strategy. DOE has a responsibility to ensure that the Yucca Mountain repository does not hinder or counter-act long-standing economic development programs sponsored by Lincoln County. Mitigation to offset adverse economic development impacts include:

1) DOE should encourage the use of Small Business Administration certified HubZone businesses located in Lincoln County for the purchase of services, finished products, and building materials that could be produced or obtained locally.

2) If DOE develops a rail spur through Lincoln County to the Yucca Mountain repository, new areas of the County could gain rail access. Such access may stimulate the County's mining industry, particularly for industrial minerals that require rail transport to make their exploitation feasible. DOE should establish policy that will allow Lincoln County to benefit from the new rail spur.

3) The repository and supporting activities should not preclude the development of the vast resources in Lincoln County, including the many industrial minerals, such as Perlite,

clays, soil additives, pumace, cinder, diatomite, fluorspar, gypsum, and zeolites. Fossil fuels have also been located in Nevada and Lincoln County has one of the largest known domestic oil reserves in the country. The potential for Nevada oil and gas production is significant. Opportunities to develop these resources should not be compromised by the repository.

4) DOE could establish satellite offices for DOE clerical and management functions in Lincoln County. In a 1998 survey question about employment opportunities at NTS or Yucca Mountain, survey respondents indicated that former household members would return to the area if employment opportunities were available. Based on this survey result, the total number of former household members from Lincoln County who might return to the area if there were employment opportunities is estimated to be 640 persons (Intertech Services Corporation, 1998).

5) Rachel, in particular, could benefit from Yucca Mountain employees that choose to live there due to the proximity to the facility. Rachel is approximately 70 miles northeast of Yucca Mountain. However, some potential residents may choose to live further away in other communities that have greater amenities. If DOE were to participate in a comprehensive development program for the Rachel area, in conjunction with providing housing and vanpools to the facility, the economic vitality of the region would be enhanced. This would as serve as a clear demonstration of a benefit accruing to Lincoln County, in return for the perceived and real health, safety, and risk effects associated with the repository.

At 300-500 persons the needed public infrastructure in the Rachel area would cost an estimated $2 to-3 million dollars. As the community grows, so will its needs for public infrastructure. At 300-500 persons it is estimated that between $240 and 350 thousand dollars would be required annually for infrastructure operation and maintenance.

6) Funding for Lincoln County and the City of Caliente to market the area to both repository spin-off and non-repository industries.

5.2.13.3 Real Property

1) Establish pre-project property value data-base.

2) Monitor for changes in property values along the transportation corridor.

3) Monitor for changes in property values throughout the community.

4) Set in place clear impact threshold criteria that will trigger compensation to property owners and a mechanism for compensation.

5.2.14 Delayed (Anticipated) Effects

The Yucca Mountain repository will occur over more than two decades, with a significant number of "firsts," including the mass transport of high-level nuclear waste across the county, through urban and rural areas, and into the State of Nevada. These facts indicate that all effects cannot be identified at the outset and that for the duration of the project, DOE needs to be both vigilant and flexible in identifying impacts and providing appropriate mitigation and compensation to the affected communities.

This report has identified a number of areas where effects can be anticipated, but the magnitude and results are uncertain. Under these circumstances, additional mitigation and compensation may be necessary. Some events that might occur in the future and are beyond the control of Lincoln County include:

1) The detection of heightened radiation levels due to incident-free activities or due to an accident that results in the release of radioactivity into the environment.

2) Costs to the County emergency management system in the event of an accident involving a truck, locomotive or other vehicle engaged in business related to the Yucca Mountain repository. This would include both "normal" accidents as well as accidents that result in the release of radioactivity into the environment.

3) Costs incurred by the hospital to treat patients in the event of an accident involving a truck, locomotive or other vehicle engaged in business related to the Yucca Mountain repository. This would include both "normal" accidents as well as accidents that result in individual contamination.

4) Costs incurred by the local government if stigma-related effects result in a declining population or growth that is lower then anticipated for planning purposes (fixed capital outlays to service a smaller population base).

5) Reduced tourism (which results in lower personal income and a reduced taxes) due to stigma-induced effects.

6) Costs incurred by the County and City to enhance business marketing efforts to mitigate stigma-induced effects.

7) Compensation for reduced property values along the transport routes, if these properties decline in value due to stigma effects.

DOE should initiate advance agreements with the affected communities to continue mitigation and compensation throughout the duration of the Yucca Mountain repository project.

6.0 Equity Considerations

Construction and operation of the Yucca Mountain repository system will result from the unilateral imposition of the project upon the residents of Nevada. Development and operation of the repository at Yucca Mountain will resolve a vexing national environmental problem through concentration of the risks associated with the Nation's inventory of spent nuclear fuel and other high-level radioactive waste in Nevada. The imposition of this potential health hazard is in addition to risks associated with nuclear weapons testing and the disposal of low-level radioactive waste at the Nevada Test Site.

Transportation of spent nuclear fuel and disposal of the waste in Nevada is a service the state and her units of local government will be providing, albeit involuntarily, to the rest of the Nation. The environmental and public health risks associated with storage of waste at numerous sites throughout the Nation will be concentrated in Nevada. A currently unacceptable and uncertain institutional process for long-term stewardship of the wastes will be abated through centralized storage and disposal at Yucca Mountain. Indeed, the Nation's possible need for additional nuclear energy may in part hinge upon developing and operating the repository at Yucca Mountain.

The waste management service that Nevada may be forced to provide is an obligation which no other state has been willing to accept. The federal leadership has demonstrated a willingness to pay large sums of money to develop and operate a deep geologic repository. While many other states in the Nation will benefit from the Yucca Mountain repository, some arguably more so than others, Nevada will accrue no clear net benefit from the project and in fact will be left with a significant unmitigated impact. Nevada and her units of local government, as agents for the residents and businesses whom are located here, should share proportionately in the National benefit to be achieved through development and operation of the repository system.

One method of estimating the total value of Nevada's service to the Nation is to apply a modest percentage of the American society's willingness to pay for safe, centralized storage and disposal of spent nuclear fuel and other high-level radioactive wastes. One measure of that willingness to pay is the total estimated cost of the repository system for which the United States Congress has

established a fee schedule and from which the Congress has appropriated monies to cover costs of developing the repository system. DOE's most recent estimate of the total life cycle cost of the civilian radioactive waste management program is $58 billion dollars (Dyer, 2001).

Alternatively, one could consider that the value of the service being provided by the State of Nevada and her local governments is equal to the avoided cost of leaving the waste where it is now and where it may in the future be produced and stored (No-Action Alternative). Table 2-6 of the Yucca Mountain Draft Environmental Impact Statement estimates the cost for the first 100 years of the No-Action Alternative at $51.5 to $56.7 billion. Another $4.9 billion is required under the No-Action Alternative for waste management over the last 9,900 years of storage. If inflated to current 2000 dollars, the costs of No-Action likely approach $70 billion. When one considers that the current life-cycle cost of the Yucca Mountain repository system is $58 billion, the avoided cost of not doing the No-Action Alternative may be approaching $12 billion dollars. Collectively, the Nation's willingness to pay and its desire to save represent one measure of the national benefit which might be assigned to the Yucca Mountain repository system.

Nevada and her affected units of local government should share in the National benefit of developing and operating the Yucca Mountain repository. Mitigation, including compensation, of impacts merely keeps Nevada whole in the sense of pre-project conditions. Mitigation, including compensation, of impacts does not address Nevada's share of the National benefit which results from the Yucca Mountain repository system. An equity payment is needed to enable Nevada and her affected units of local government to share in the benefits the repository system posits for the rest of the Nation.

It is suggested that a factor of 5-10 percent be applied to the amount the Nation is willing to pay to for the safe storage and disposal of nuclear waste in Nevada as a means to enable the State and her affected units of local government to share in the national benefit proffered by the repository system. At 5-10 percent, the total equity payment to Nevada would range from $2.9 to $5.8 billion dollars. If provided to Nevada as one or more trust funds, this amount would yield $290 to $580 million annually for the State. These funds should be made available to the State of Nevada; affected units of local government in Nevada; and certain non-profit economic and

community development entities within said counties for use in making investments in the future economic and fiscal vitality of the State and to enhance the public health, safety and well being of its residents. In addition to a one-time payment from the Nuclear Waste Fund (to avoid the uncertainty associated with annual Congressional appropriations), the benefit might take the form of procurement guarantees to stimulate business and industry in Nevada; transfer of public land for community expansion; location and funding of federal research and development initiatives in Nevada; and federal income tax abatements for Nevada residents; among other possibilities. Conceptually, the ratepayer/utility portion of the benefit payment could be in the form of cash while the benefit associated with DOE defense weapons programs might take other forms as described above.

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